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The Journal of the SOCIETY OF DYERS AND COLOURISTS

Volume 72 Number 9

CONTENTS

THE SOCIETY OF DYERS AND COLOURISTS
19 PICCADILLY · BRADFORD 1 · YORKSHIRE

Notice to Authors of Papers

The MSS. of all papers communicated to or read before the Society become the property of the Society. They should be addressed to the Editor, Society of Dyers and Colourists, 19 Piccadilly, Bradford 1. Authors must not allow their papers to be published elsewhere before they have appeared in the Society's *Journal*. Should prior publication take place without the sanction of the Publications Committee, the paper will be printed only as an abstract or summary.

Manuscripts submitted for publication in the *Journal* should be typewritten (double spacing) on good-quality paper, using one side of the paper only and leaving a margin at least 1 in. wide on the left-hand side. The time taken in refereeing papers (both lectures and communications) will be reduced to a minimum when authors submit two copies of the typescript.

In view of the high costs of publication, it is essential that authors should be as concise as possible. When experimental procedure has already been published, a literature reference to the paper containing the details is sufficient, whilst well known experimental methods should be described very briefly.

Introductory paragraphs describing the aims of the investigation and the method of attack are desirable, and should be followed by the experimental results and their discussion. There should be a brief summary for insertion at the beginning of the paper. References to the literature should be numbered consecutively, using superscript numbers without brackets immediately following the text words or author's name to which they refer.

The list of references should be given at the end of the manuscript and the abbreviations used should be, as far as possible, those given in the "List of Periodicals Abstracted" included at the end of the index to the preceding year's *Journal*. Reference numbers in this list should be neither enclosed in brackets nor followed by full-stops. As far as possible throughout the manuscript the abbreviations listed in the Jan. 1950 issue (p. 54) should be used. Tables should be numbered consecutively in Roman numerals and Figures in Arabic numerals.

The number of figures and graphs should be kept as low as possible, and data should be presented in the form of either tables or graphs, not both. Drawings should be carefully prepared, preferably in Indian ink, on plain white drawing paper or, preferably, Bristol board. In graphs, the frame and actual curves should be ruled and inked more heavily than any co-ordinate lines, and the latter should not be close together as in ordinary graph paper. Experimental points should always be given, and where several graphs appear in a single Figure clear means of differentiation must be adopted. All numbers and legends are set up in type by the printer, and authors should therefore indicate them lightly in pencil.

Twenty-five free copies of a reprint are supplied to the author of an original paper published in the *Journal*, or fifty free copies are supplied when there are two or more authors, and a further number may be purchased from the Society at the rates given below.

REPRINTS OF LECTURES AND COMMUNICATIONS

Reprints of all lectures and communications are available after publication to members and non-members of the Society. The charges (postage included) are as follows— Single copies 2s. 6d. each; per dozen copies up to and including 8 pages, 12s. 6d., and for papers occupying more than 8 pages of the *Journal*, 17s. Orders should be addressed to "The Society of Dyers and Colourists, 19 Piccadilly, Bradford 1". They can be accepted only if accompanied by remittance and if received immediately after publication of the paper.

The Journal of the Society of Dyers and Colourists

(Subscription rates for non-members £4 per annum, post free)
(Abstracts section only printed on one side of paper— £1 10s 0d per annum)

NOTICE TO MEMBERS AND SUBSCRIBERS

Readers requiring *general information* regarding the Official Notices, List of Officers of the Society, etc. should consult pages 1–6 of the January 1956 and pages 313–317 of the July 1956 issues of the *Journal*, or write to *The General Secretary*, The Society of Dyers and Colourists, Dean House, 19 Piccadilly, Bradford 1, Yorkshire (*Telephone* Bradford 25138–9). *Editorial Communications* should be addressed to *The Editor*, at the same address.

Forthcoming Papers

The following papers have been accepted by the Publications Committee, and will appear in future issues of the *Journal* —

LECTURE

The Disperse Dyes — their Development and Application — *R. K. Fourness*

COMMUNICATIONS

Light Fastness Assessments of Dyed Textiles and their Bearing upon the Mechanism of Fading — *J. C. Eaton and C. H. Giles*

The Desorption of Level-dyeing Acid Dyes from Wool — *C. H. Nicholls*

THE SOCIETY OF DYERS AND COLOURISTS

THE FOURTH LONDON LECTURE

"COLOUR IN FASHION"

by JAMES LAVER Esq C.B.E

Keeper Departments of Textiles and Engravings Illustrations and Design
The Victoria and Albert Museum

will be held at

THE WALDORF HOTEL
Aldwych London WC2

at 7 pm on

FRIDAY 19 OCTOBER 1956

(not on 5th October 1956 as previously announced)

FORTHCOMING MEETINGS OF THE SOCIETY

Tuesday, 25th September 1956

SCOTTISH SECTION. *Man-made Fibres in the Carpet Trade — Dyeing of Staple and Yarns.* R. C. Cheetham, Esq., A.M.C.T., F.R.I.C. (Courtaulds Ltd.). St. Enoch Hotel, **Glasgow.** 7.15 p.m.

Friday, 28th September 1956

NORTHERN IRELAND SECTION. Perkin Centenary Dinner and Ball. Woodbourne House Hotel, Suffolk, **Dunmurry.** Reception 7.30 p.m., Dinner 8 p.m.

SCOTTISH SECTION. Perkin Centenary Dinner-Dance — Ca'doro Restaurant, **Glasgow.** 7 p.m. for 7.30 p.m.

Wednesday, 3rd October 1956

MIDLANDS SECTION. *A New Method for the Continuous Dyeing of Hydrophobic Fibres.* D. A. Garrett, Esq., M.A. King's Head Hotel, **Loughborough.** 7 p.m.

Thursday, 4th October 1956

NORTHERN IRELAND SECTION. *Man-made Fibres with Special Reference to their behaviour alone and in Blend Form on Modified Flax Machinery.* R. G. Cairns, Esq. (Courtaulds Ltd.). Joint Meeting with Textile Institute, Kensington Hotel, **Belfast.** 7.30 p.m.

Friday, 5th October 1956

LONDON SECTION. *Reactive Dyes for Textiles.* T. Vickerstaff, Esq., M.Sc., Ph.D., A.R.I.C., F.S.D.C. (I.C.I. Ltd.). Royal Society, Burlington House, **London W.1.** 6 p.m.

Tuesday, 9th October 1956

HUDDERSFIELD SECTION. *Some Investigations into the Application of Dyes on Acrylic Fibres.* B. Kramrisch, Esq., F.R.I.C., F.T.I., F.S.D.C. (Joint lecture with Huddersfield Section R.I.C.). Silvios Cafe, Westgate, **Huddersfield.** 7.30 p.m.

Wednesday, 10th October 1956

NORTHERN IRELAND SECTION. *Fading Lamps— A Curse or a Blessing.* K. McLaren, Esq., B.Sc., F.R.I.C., F.S.D.C. (I.C.I. Ltd.). Thompson's Restaurant, Donegall Place, **Belfast.** 7.30 p.m.

Friday, 12th October 1956

WEST RIDING SECTION. Supper and Smoker, Victoria Hotel, **Bradford.** 7.30 p.m.

Tuesday, 16th October 1956

SCOTTISH SECTION. *The Life and Work of Perkin.* Professor J. Read, Ph.D., M.A., F.R.S. St. Enoch Hotel, **Glasgow.** 7.15 p.m.

Friday, 19th October 1956

LONDON SECTION. Fourth London Lecture. *Colour in Fashion.* James Laver, Esq., C.B.E. (Keeper of the Departments of Textiles and Engravings and Illustrations and Design, The Victoria and Albert Museum). Waldorf Hotel, **London W.C.2.** 7 p.m.

MANCHESTER SECTION. *A New Class of Dyestuffs— The Behaviour of Reactive Dyes in Dyeing and Printing.* T. Vickerstaff, Esq., M.Sc., Ph.D., A.R.I.C., F.S.D.C. (I.C.I. Ltd.). Textile Institute, 10 Blackfriars Street, **Manchester.** 7 p.m.

Saturday, 20th October 1956

MIDLANDS SECTION. Perkin Celebration Dinner Dance. Welbeck Hotel, **Nottingham.** 7 p.m.

Monday, 29th October 1956

HUDDERSFIELD SECTION. *The History and Development of Fashions in Wool.* S. Morse-Brown Esq. (Joint lecture with Huddersfield Textile Society). Large Hall, Technical College, **Huddersfield.** 7.30 p.m.

Wednesday, 31st October 1956

MIDLANDS SECTION. *Reactive Dyes— A New Approach to Cellulose Dyeing.* T. Vickerstaff, Esq., M.Sc., Ph.D., A.R.I.C., F.S.D.C. Albert Hall Institute, **Nottingham.** 7 p.m.

WEST RIDING SECTION. Perkin Centenary Lecture— *The Life and Work of Perkin.* Professor John Read, Ph.D., M.A., F.R.S. (University of St. Andrews). Hotel Metropole, **Leeds.** 7.30 p.m.

Thursday, 1st November 1956

WEST RIDING SECTION. Perkin Centenary Lecture— *Early Stages in the Renaissance of the British Dye Industry. Tales from Turnbridge, Huddersfield, 1899–1920.* C. M. Whittaker, Esq., D.Sc., F.T.I., F.S.D.C. Victoria Hotel, **Bradford.** 7.30 p.m.

Friday, 2nd November 1956

LONDON SECTION. *What the Dry Cleaner expects from Textiles and Textile Finishes.* D. D. McCordall, Esq., (Achille Serre) (Joint meeting with the London Centre of the Guild of Dyers and Cleaners). Royal Society, Burlington House, **London W.1.** 6.30 p.m.

WEST RIDING SECTION. Perkin Centenary Celebration Dinner and Dance. Victoria Hotel, **Bradford.** 7 p.m.

Thursday, 8th November 1956

WEST RIDING SECTION. *A New Approach to Dyeing.* Lecturers, L. Peters, Esq., M.Sc., Ph.D., and C. B. Stevens, Esq., Ph.D., F.S.D.C. (The University of Leeds). Victoria Hotel, **Bradford.** 7.30 p.m.

Friday, 9th November 1956

HUDDERSFIELD SECTION. Annual Dinner. Silvios Cafe, Westgate, **Huddersfield.** 7.30 p.m.

Tuesday, 13th November 1956

SCOTTISH SECTION. *Levelling Problems in the Dyeing of Vat Dyes.* H. Musshoff Esq. (Cassella). St. Enoch Hotel, **Glasgow.** 7.15 p.m.

Wednesday, 14th November 1956

NORTHERN IRELAND SECTION. Perkin Centenary Lecture— *Life and Work of Perkin.* J. Boulton, Esq., M.Sc. (Tech.), F.R.I.C., F.T.I., F.S.D.C. (Courtaulds Ltd.). (This lecture will be followed by a buffet supper.) Thompson's Restaurant, Donegall Place, **Belfast.** 7.30 p.m.

Tuesday, 20th November 1956

HUDDERSFIELD SECTION. *Reactive Dyes— A New Approach to Cellulose Dyeing.* T. Vickerstaff, Esq., M.Sc., Ph.D., A.R.I.C., F.S.D.C. Silvios Cafe, Westgate, **Huddersfield.** 7.30 p.m.

Thursday, 22nd November 1956

MANCHESTER SECTION. Ladies' Evening. (Date and Time to be announced later.)

MIDLANDS SECTION. *Applications of Colour Physics to Textiles.* (A simple account for the practical man.) J. C. Guthrie Esq., M.Sc., F.Inst.P., F.T.I., and P. H. Oliver Esq., B.Sc., Grad.Inst.P. College of Technology, **Leicester.** 7 p.m.

WEST RIDING SECTION. Lecture. Details later. **Leeds.** 7.30 p.m.

Thursday, 6th December 1956

WEST RIDING SECTION. *Reactive Dyes— A New Approach to Cellulose Dyeing.* T. Vickerstaff, Esq., M.Sc., Ph.D., A.R.I.C., F.S.D.C. (I.C.I. Ltd., Dyestuffs Division). Victoria Hotel, **Bradford.** 7.30 p.m.

Friday, 7th December 1956

LONDON SECTION. *The Chemical Revolution in Textile Technology.* Professor J. B. Speakman, D.Sc., F.R.I.C., F.T.I. (Leeds University). (Joint meeting with the London Section of the Textile Institute.) Royal Society, Burlington House, **London, W.1.** 6 p.m.

Tuesday, 11th December 1956

HUDDERSFIELD SECTION. *Problems of a Commission Dyer.* H. V. Partridge, Esq., M.Sc., A.T.I. Silvios Cafe, Westgate, **Huddersfield.** 7.30 p.m.

SCOTTISH SECTION. *Full Shades on Secondary Acetate and 'Tricel' and Allied Topics.* H. C. Olpin, Esq., M.Sc., F.R.I.C., F.S.D.C. and J. Wood, Esq., B.Sc., A.R.I.C. (British Celanese Limited). St. Enoch Hotel, **Glasgow.** 7.15 p.m.

Wednesday, 12th December 1956

MIDLANDS SECTION. *The Finishing of Garments and Fabrics of Bulked Terylene.* G. McLeavy, Esq., B.Sc., Ph.D., A.R.I.C. King's Head Hotel, **Loughborough.** 7 p.m.

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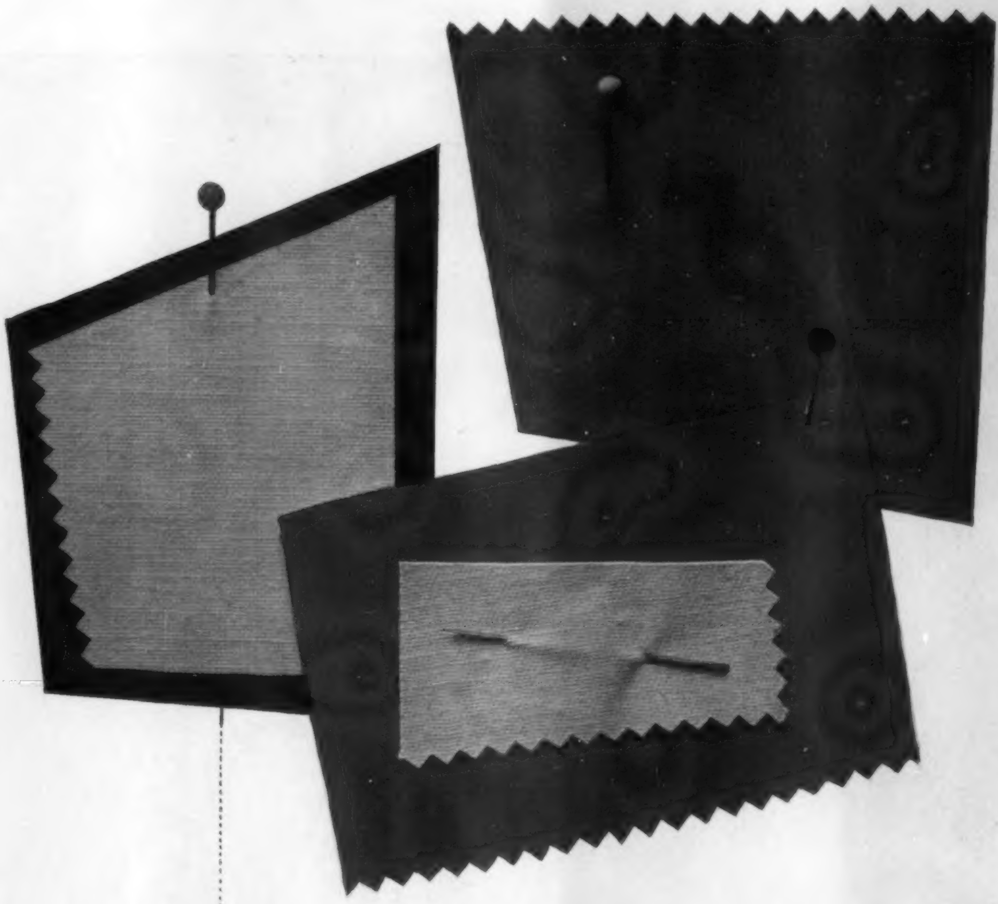


THE JOURNAL OF THE Society of Dyers and Colourists

Volume 72 Number 9 SEPTEMBER 1956 *Issued Monthly*

Examination for the Associateship (A.S.D.C.) 1956

The third examination for the Associateship of the Society of Dyers and Colourists was held in June 1956, and below appear the question papers and the report of the Examinations Board. It is hoped that publication of these papers and the report will be helpful both to prospective candidates and to teachers, and that it will serve to inform members of the Society and others of the standard of knowledge expected from candidates for the Associateship.

Examination Papers

*Papers A and B are taken by all candidates; but Papers C, D, and E are taken by a candidate only in his chosen branch of tinctorial technology. Further, in Paper E a candidate has a choice of subject— analytical and testing techniques or the organisation of production and economics**

Paper A

General Chemistry and Properties of Dyes, Pigments, Auxiliary Products General Chemistry and Properties of Organic High Polymers

10 a.m.–1 p.m. on Thursday, 14th June 1956

(SIX questions only to be attempted, three from each section of the paper)

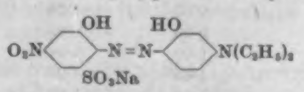
SECTION I

1. Compare the structures and the properties of basic dyes with those of acid dyes, giving at least one example of each type to illustrate your answer.

2. Give an account of the preparation of one of the phthalocyanines. Which members of this class of compounds are used as pigments and what are their outstanding properties?

3. What is meant by the term anionic surface-active agent? Give examples of agents of this type, indicating their constitution and describing their application in industry. Mention **one** other class of surface-active agent, pointing out the essential chemical difference between it and the anionic type.

4. What individual contribution to the properties of the whole dye do the various groups make in the following hypothetical dye—



What fibres would you expect it to dye (i) as it stands **and** (ii) without the SO_3Na group?

5. An amino derivative of anthraquinone is found to contain 11·8% nitrogen (C = 12, N = 14, O = 16, H = 1). When heated with caustic soda and sodium hydrosulphite it gives off ammonia. With benzoyl chloride it yields a red vat dye. Explain these reactions and deduce the structure of the original amino compound.

6. How is benzanthrone prepared and converted into blue and green vat dyes?

7. Discuss the significance of the molecular structure of those metal-complex dyes which are applied to wool from a strongly acid bath (e.g. the Neolan dyes) and those which give good dyeings from a neutral or weakly acid bath (e.g. the Irgalan dyes).

8. What types of azo dyes are converted into their calcium and barium compounds for use as pigments? Give an account of this process, and discuss in general terms the critical factors in the production of satisfactory products.

SECTION II

9. Additive polymerisation is said to proceed by a chain mechanism. Explain what is meant by this, illustrating your answer by reference to an actual polymerisation process.

10. Write concise explanatory notes on **four** of the following—

(a) Cross-linking
(b) Moisture accessibility
(c) Molecular weight distribution
(d) Suspension polymerisation
(e) Graft copolymer
(f) Dilution ratio.

* In Branch 4 only Paper E(i) was required

11. Discuss **either** the mechanism of denaturation of proteins **or** the nature of the cross-linking in urea–formaldehyde resins.

12. Distinguish between weight-average and number-average polymer molecular weights. Outline methods by means of which each of these may be determined.

13. Discuss the influence of the close-packing properties of the chains on the crystallinity of a high polymer. What chemical properties of the chains may affect crystallinity?

14. Write a short essay on **one** of the following topics—

(*a*) The elasticity of rubber

(*b*) The etherification of cellulose

(*c*) Copolymerisation.

Paper B

Theories of Colour
Relation of Colour to Constitution
Colour Assessment and Colour Fastness

2–5 p.m. on Thursday, 14th June 1956

(*FIVE questions only to be attempted*)

1. Describe any recent development in instruments for measuring colour with which you are familiar.

2. Describe how you would follow quantitatively **either**—

(*a*) The absorption of a vat dye by cotton during the steaming of a printed fabric

or (*b*) The absorption of chrome dyes by wool in the metachrome process.

3. How may colour measurements be used to formulate dyeing or pigment mixture recipes for colour matches?

4. Compare the colour effects produced by blending blue and yellow dyed fibres with those obtained by dyeing the fibre with a mixture of the same two dyes. How does the amount of dye used to produce a grey by blending black and white fibres compare with that required to produce a similar grey by yarn dyeing? What effect would you expect this difference to have on the fastness properties of the two yarns?

5. What do you understand by any **four** of the following terms—

(*a*) Colour gamut

(*b*) Saturation

(*c*) Brightness

(*d*) Strength

(*e*) Semi-chrome

(*f*) Shadow series

(*g*) X, Y, Z?

6. When two coloured lights are mixed additively, the colour of the mixture is represented in the chromaticity diagram by a point on the straight line joining the points representing the two colours. When two dyes are mixed, the mixtures usually lie on a curve between the two extremes. Why is this?

7. What features of molecular structure are responsible for light absorption in the ultraviolet, visible, and infrared regions of the spectrum? What importance can be attached to a strong ultraviolet absorption in the 350–400 mμ. region in a dye?

8. In comparing two samples of coloured material it is frequently necessary to describe the difference in colour verbally in a semi-quantitative manner. What terms would you use to specify such colour differences? Indicate the number of variables required, and define the physical significance of the terms used.

9. Light absorption takes place along a well defined axis in a dye molecule. How has this fact been used to investigate some aspects of dyeing mechanism?

10. Discuss the relative merits of a colour atlas and a simple three-filter colorimeter for the purpose of classifying and filing patterns in a dyehouse.

11. Write an essay on **one** of the following topics—

(*a*) Putting fluorescence to practical use

(*b*) Colour harmony— fact or fantasy

(*c*) The problem of defective colour vision in colour-using industries.

12. An anthraquinone disperse dye can be prepared by two different routes to give products A and B which are of different colour. When purified by repeated crystallisation both A and B yield the same pure dye. The absorption data on acetone solutions of A and B and the pure dye are given in the table below. What conclusions can be drawn regarding the impurities present in A and B?

Wavelength (mμ.)	Optical Densities of Solutions of Pure Dye	Dye A	Dye B
400	0·10	0·12	0·11
420	0·06	0·11	0·08
440	0·09	0·22	0·15
460	0·20	0·43	0·31
480	0·38	0·69	0·54
500	0·61	0·88	0·75
520	0·86	1·18	1·02
530	0·97	1·30	1·14
540	0·95	1·26	1·10
560	0·89	1·05	0·97
580	1·00	1·04	1·02
590	1·04	1·06	1·05
600	1·04	1·05	1·04
620	0·66	0·66	0·66
640	0·33	0·33	0·33
660	0·12	0·12	0·12

BRANCH 1— TINCTORIAL TECHNOLOGY AS APPLIED TO TEXTILES

Paper C

Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.–1 p.m. on Friday, 15th June 1956

(*Not more than SIX questions are to be attempted, of which at least ONE should be taken from Section I*)

SECTION I

1. Calculate the *affinity* of a direct cotton dye Na_2D on bleached cotton at 90°C. from the following information—

Molecular weight of dye	750
Equilibrium concentration of dye in bath	9·0 g./litre
Equilibrium concentration of sodium ions in bath	20 milliequiv./litre
Equilibrium concentration of dye in fibre	3·375 g. per kg. of dry fibre
Water absorption of cellulose at 90°C. and 100% R.H.	0·22 litre per kg. of dry fibre

R = 1·986 cal./°C. per gram-molecule

$\ln x = 2{\cdot}303 \log x$

The concentration of sodium ions in the fibre is to be assumed equivalent to the concentration of absorbed dye ion.

(*Tables of logarithms are provided.*)

2. Define the term *redox potential*. Outline a suitable method for determining the value of this quantity for a vat dye system, and comment on its practical significance.

3. What experimental methods have been devised for measuring the rates of diffusion of dyes in textile fibres? Discuss the relation between rate of diffusion and time of half-dyeing.

SECTION II

4. Name the principal groups of non-fibrous impurities in grey cotton, and give their distinctive properties and approximate proportions. Discuss the influence that each might be expected to have upon the course of dyeing and printing, and upon the properties of the coloured textile, if it were not removed.

5. Discuss **one** of the following topics—

(*a*) The suitability of thiourea dioxide as a reducing agent in dyeing and printing

(*b*) The essential chemical reactions on which the production of white discharges upon vat-dyed grounds depends

(*c*) The use of stabilised forms of the active component for the production of printed azoic styles

(*d*) The use of emulsion thickeners in pigment and other printed styles.

6. Outline the chief features of the classification of vat dyes according to the conditions of reduction and application. What is the significance of this classification, and how far may it be deemed satisfactory?

7. Discuss the importance of sulphur dyes in modern practice.

8. Compare the behaviour of wool, silk, **and** nylon towards— (i) acids, (ii) acid dyes, **and** (iii) chrome dyes.

9. Describe, with an assessment of its significance, any recently published investigation on **one** of the following—

(*a*) The application of chrome dyes to wool by the afterchrome method

(*b*) The dyeing **or** the printing of acetate rayon with disperse dyes

(*c*) The use of hydrolysable esters for controlling rate of dyeing.

10. Outline the general chemical principles which underlie the application of esters of leuco vat dyes to cellulosic and protein fibres, and comment on their technical importance.

11. Discuss the dyeing behaviour of the following mixtures of fibres—

(*a*) Wool and chlorinated wool

(*b*) Viscose rayon and acetate rayon

(*c*) Cotton and nylon.

12. What advantages accrue from dyeing textile fibres at temperatures above 100°C., and in what circumstances can this procedure be applied?

13. Discuss the methods available for stripping dyes from textile materials and indicate the principles which underlie each method.

Paper D

Industrial Procedures and Plant

2–5 p.m. on Friday, 15th June 1956

(*SIX questions only to be attempted. The construction and operation of machines to be illustrated, where possible, with sketches*)

1. Define what you understand by the word *setting* as applied in the processing of polyamide and polyester fibres. What methods are used, why is it necessary to have more than one, and what are the merits of each?

2. Write a short essay on **one** of the following topics—

(*a*) The use of matching lamps

(*b*) The virtues and the shortcomings of laboratory matching.

3. What methods are commonly used for drying textile fabrics and what are their respective merits? What methods have been suggested to speed up drying and to increase the efficiency of drying machines?

4. How would you prepare and dye the following fabrics—

(a) An all-viscose rayon lining

(b) A spun rayon staple gabardine

and (c) An all-acetate rayon locknit fabric?

What are the fastness requirements of the finished fabrics?

5. What advantages are claimed for the dyeing of yarns in wound packages rather than in hanks? Describe in detail **one** method of package dyeing.

6. For what purposes are steamers used in fabric printing and what precautions are necessary in their use? Describe how you would produce, on a material of your choice, a white discharge print on a blue ground suitable for dresswear.

7. There are three methods of applying mordant dyes to wool. Give a short description of each method and state where each finds a use in practice.

8. What are the advantages and the disadvantages of continuous dyeing methods? Describe **one** method of continuous dyeing.

9. Large quantities of effluents come from dyehouses and printworks. Why is it necessary to purify such effluents and what methods of treatment are used?

10. The word "carrier" is now common in dyeing literature. What substances act as carriers and what effect do they have in dyeing and printing? Illustrate your answer with reference to Terylene.

11. Describe in detail a modern winch machine. What points would you look for if you had to purchase one? What types of fabric can be dyed in a winch machine, and what precautions would you take to prevent mechanical damage to fabric during winch processing?

12. Comment on the practical difficulties likely to be encountered in preparing, dyeing, and finishing **either** wool–nylon half-hose or wool–regenerated protein fibre suitings. Indicate where the methods of processing differ from those used for all-wool goods, and how the above-mentioned difficulties are overcome or avoided.

13. What precautions are necessary in the azoic dyeing of cotton to ensure the best possible fastness to rubbing and washing on (a) yarn **and** (b) cloth?

14. Discuss the relative importance of roller printing and screen printing in modern practice. How far do you consider that modern attempts to mechanise screen printing are justifiable?

Paper E

10 a.m.–1 p.m. on Saturday, 16th June 1956

(**Either** Paper (i) **or** Paper (ii) to be attempted)

(i) Analytical and Testing Techniques

(*FIVE questions only to be attempted*)

1. A solution of a yellow dye is compared, in a colorimeter, with a standard solution. The readings on the sample are as follows—52 49 51 50 47 51 50 48 53 49 50 50 48 52 51 49. Calculate the mean value, mean deviation, variance, standard deviation of a single reading, and standard error of the mean. Explain the significance of the last item.

2. Describe the uses of **either** (a) the Pauly reagent (diazotised sulphanilic acid), **or** (b) the alkali solubility, in examining the causes of defects in wool fabrics.

3. Describe the effects of (a) mild **and** (b) severe mildew attack on cotton fabrics. State what tests you would carry out to establish (i) the presence of active mildew growth **and** (ii) the effect of past growth on alteration of dyeing affinity. What tests would you carry out to ascertain the possibility of treating the cotton to obtain level dyeing?

4. Describe the main uses of polarised light in the microscopical examination of fibres and fibre damage.

5. State how you would identify the following fibres— nylon, Orlon, Terylene, cellulose triacetate.

6. Describe the procedure you would follow to determine whether small holes in a white cellulosic fabric are due to chemical damage.

7. Discuss the question of fastness to water of red carpet yarns, and state how you would investigate the cause of bleeding of full red shades in carpets which become accidentally wetted during use.

8. Describe the procedure you would follow when systematically examining the ash of a textile fabric for metals. Discuss briefly recent developments in systematic chromatographic methods for this purpose.

9. State what you consider to be the minimum light fastness requirement for— (a) women's suits, (b) lingerie, (c) men's suits, (d) women's blouses, (e) furnishing fabrics, (f) women's evening dress fabrics, **and** (g) awnings. Describe how you would assess the fastness to light of a furnishing fabric by the current I.S.O. recommended method.

10. Describe in what circumstances certain fabrics can show colour change due to (a) sulphite fading, (b) gas fume fading. Outline the test methods you would use to determine the sensitivity of dyeings to these agencies. Give examples of inhibiting agents against gas fading, and state how you would test for their presence.

11. Describe how you would determine whether a red rayon yarn used as lettering in a label for washable garments is dyed with either a vat, an azoic, or a developed direct dye. What fastness tests would you apply to such labels?

12. State how you would determine the type and the proportion of the surface-active agent present in a proprietary detergent composition.

13. State how you would compare two samples of malt extract for their value in desizing.

14. Describe methods of cutting sections of textile fibres, suitable for routine use in a dyehouse laboratory, and give examples to illustrate the use of such sections.

15. Discuss the uses of ultraviolet radiation in the dyehouse laboratory.

16. Discuss the chromatographic analysis of dyes with special reference to the examination of dyed fabrics.

17. Discuss the use of a colorimeter for assessing the comparative strength of dyes, and state in what way and why the results could differ from an assessment made by a dyeing method.

18. Describe how you would examine, for composition and suitability for purpose, a proprietary thickening agent.

(ii) Organisation of Production and Economics

(*FIVE questions only to be attempted*)

Note— The term *finishing* is used in its widest sense to include dyeing and printing.

1. Outline the duties and the responsibilities of a head dyer in a dyeworks (**or** of a head colourist in a printworks).

2. Write a short essay on **one** of the following—

(*a*) Work study

(*b*) Storekeeping and stock control

(*c*) Accident prevention

(*d*) Time and motion study.

3. The foreman is an essential part of the management team. Discuss this statement, and suggest how he might be trained.

4. What do you understand by line and staff organisation? Illustrate your answer by drawing a rough diagram of the production organisation of a medium-sized works, showing a general chain of function and responsibility.

5. Describe some of the methods of preventing and controlling wastage in a finishing works.

6. Explain what you understand by quality control and suggest how it can be achieved in textile finishing.

7. Efficient management requires accurate costing. What information does the costing department require, and how is it obtained?

8. Write about **one** of the following—

(*a*) Incentive payments

(*b*) The personnel officer

(*c*) Joint consultation

(*d*) Industrial welfare.

9. Describe how planned maintenance of machinery and plant, which is essential for efficient working, may be achieved. Discuss some of the difficulties encountered in works practice.

10. Discuss vertical and horizontal organisation as it affects the finishing sections of the textile industry.

BRANCH 4— PAPER

Paper C

Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.–1 p.m. on Friday, 15th June 1956

(*FIVE questions only to be attempted*)

1. Discuss the differences in chemical composition between a mechanical pulp and a bleached sulphite pulp, and explain how the composition of these pulps affects their affinity for basic, acid, and direct dyes.

2. Give a brief account of current views on the mechanism of the rosin-sizing of pulp and discuss the effect of sizing on the beater addition of acid dyes.

3. Give an account of the methods used for the bleaching of mechanical pulp.

4. Survey the present state of knowledge on the ageing of paper.

5. Outline the beating process. How does beating affect the colouring of paper when (*a*) dyes **and** (*b*) pigments are added to the beater stock?

6. Outline the principles of colour matching and show how they are applied in the procedure of a paper mill laboratory. Indicate the limitations of this procedure.

7. Discuss the composition of a typical mix or "colour" used for on-machine roller coating. What is the function of each of the constituents and what factors have to be considered in formulating their respective proportions?

8. Write a brief essay on **either**—

(*a*) The application of fluorescent brightening agents to paper

or (*b*) The metallising of paper.

9. What is meant by the expression "fastness to light"? What classes of dye and furnish are particularly prone to fade on exposure to light? Give an example of a colour and a furnish used to produce a satisfactory "fast-to-light" paper.

10. Discuss recent developments in the measurement of the colour of paper.

11. Give a brief outline of the following defects in coloured paper and suggest ways in which they can be corrected—

(*a*) Two-sidedness

(*b*) Mottling

(*c*) Coloured specks

(*d*) Irregular or patchy colour on surface.

Paper D

Industrial Procedures and Plant

2–5 p.m. on Friday, 15th June 1956

(*SIX questions only to be attempted. Where possible, illustrate your answers with sketches*)

1. Discuss the characteristics of the following types of paper machine, as they affect the production of coloured paper or board—

(a) Fourdrinier (old, slow machine, open backwater system)
(b) Fourdrinier (new, fast machine, closed backwater system)
(c) M.G. machine
(d) Multi-vat board machine.

2. Describe the layout and the equipment for a colour room in a mill making a wide variety of coloured papers.

3. What factors would influence the choice of colouring matters for the following types of paper—

(a) M.G. poster
(b) High-class bond
(c) Sugar bag
(d) Kraft wrapping
(e) Newsprint.

4. How would you produce a laboratory match to a pattern and what precautions would you take in transferring that laboratory match to the machine?

5. What causes two-sidedness in coloured paper? What can be done to minimise this trouble?

6. The normal method of dissolving dyes in buckets is inefficient, laborious, and often wasteful. What alternative system offers advantages?

7. Describe the essential features of the production of the following special papers—

(a) Blotting
(b) Mottled or granite
(c) Marbled
(d) Imitation parchment.

What kind of colouring matters are required for each?

8. Describe a modern continuous stock preparation system and suggest how dyes could be applied continuously in this plant.

9. Variation occurs in the shade of paper during a run. Assuming the beaterman to be blameless, what are the most likely causes of this variation?

10. In what ways can the following affect colouring and its control—

(a) Inefficient washing of a bleached rag stock
(b) The degree of beating of a furnish
(c) The use of mixed furnishes
(d) The re-use of broke
(e) Foam
(f) Heavily coloured backwater?

Paper E(i)*

Analytical and Testing Techniques

10 a.m.–1 p.m. on Saturday, 16th June 1956

(*FIVE questions only to be attempted*)

1. Outline a scheme for classifying the dye used in a yellow coloured paper, assuming that you are given a sample of the dyed paper and that only one main dye has been used in it.

2. What apparatus is commonly used to measure differences in the shade of off-white papers in terms of brightness? Illustrate your answer with a sketch showing the principle of the apparatus and point out the limitations of the method.

3. How would you test the following pigments for suitability for use in (a) paper manufacture and (b) the coating of paper—

(i) Ultramarine
(ii) Prussian blue
(iii) Yellow ochre?

Outline suitable specifications in each case.

4. Write a short essay on the use of fluorescence in ultraviolet radiation as a means of identification and purity control of colouring matters, with special reference to paper and paper products.

5. You are given a coloured sheet of paper which has to be matched in shade only, and also a sample of the bleached pulp to be used in making the match. How would you ascertain empirically what dyes, and what proportions of these dyes, are to be used in order to obtain the same effect?

6. What methods are available for the determination of the particle size of pigments used in the coating of paper? Discuss the relative merits of the methods and describe one in detail.

7. What is the present state of knowledge regarding the testing of coloured papers for fastness to light? Indicate the trend of future developments towards a standard testing method.

8. Describe qualitative tests which can be applied to the ash of a sample of paper in order to determine which of the common lakes has been used for the dye present.

9. You have to deal with a complaint that the coloured paper cover of a book has changed in shade during use. How would you ascertain whether this is due to the action of—

(a) Light
(b) Handling
(c) The adhesive used
(d) Atmospheric impurities, or
(e) Any other cause?

10. Outline methods for determining the following substances when present in a dye—

(a) Starch
(b) Glauber's salts
(c) Epsom salts
(d) Sugar.

* Paper E(ii) was not required in Branch 4.

BRANCH 6—TINCTORIAL TECHNOLOGY AS APPLIED TO COATED FABRICS, LEATHERCLOTHS, LINOLEUM, Etc.

Paper C

Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.–1 p.m. on Friday, 15th June 1956

(*FIVE questions only to be attempted; Question 1 must be included*)

1. Describe the principal types of material applied to cloth in the manufacture of coated fabrics, leathercloth, linoleum, etc. Compare their properties and state the uses to which each type may successfully be applied. Outline the chemical and physical mechanisms upon which the processes of manufacture depend.

2. What factors affect the suitability of colouring matters for use in fabric coating? Describe the tests employed to assess the merit of a particular pigment.

3. What is meant by the *degree of dispersion* of a pigment? What are the effects of varying the degree of dispersion of pigment in a fabric coating upon the properties of the material?

4. Compare the calendering process with the paste-spreading methods for application of a polyvinyl chloride type of coating to a woven base. What physical properties are required in a polyvinyl chloride spreading paste?

5. Write notes on **two** of the following—

(i) Finishing methods employed to impart a decorative appearance to coated fabrics

(ii) The selection of a particular type of nitrocellulose as the film-forming agent in a leathercloth

(iii) The use of *iso*cyanates in coated fabrics

(iv) Polymeric plasticisers.

6. Give, with reasons, the type of fibre and the construction of the fabric most suitable as a base for a coated fabric to be used for—

(i) High-quality soft upholstery

(ii) Floor covering

(iii) Bookbinding

(iv) An acid-proof industrial apron.

7. Discuss recent work on the mechanism of thermal degradation of polyvinyl chloride. Enumerate the substances which may be used as stabilisers against thermal degradation, and indicate the merits of each in coated-fabric applications.

8. What are the main requirements of a pigment to be used in a coating based on—

(*a*) Polyvinyl chloride

(*b*) Nitrocellulose

(*c*) Linseed oil?

9. Describe and give the chemical composition of fillers commonly used in the coated-fabrics industry. What are the ideal properties of a filler, and to what extent do the known fillers approach the ideal?

Paper D

Industrial Procedures and Plant

2–5 p.m. on Friday, 15th June 1956

(*SIX questions only to be attempted*)

1. How would you prepare a six-ounce loom-state cotton sheeting for coating with nitrocellulose in a middle-green shade? Why is it necessary to ensure that the cloth is thoroughly scoured? Give a sketch of a typical jigger.

2. Discuss the importance of the removal of irregularities from the surface of cloth intended for coating with vinyl composition. Give a sketch showing the essential points of a modern cloth-firing machine.

3. Give an account of the processes used industrially for dispersing dry pigments in plasticisers. What means are employed to counteract settling out or separation of pigment–plasticiser pastes on storage?

4. Compare the twin-roll and pug-mill processes for letting down rubber mixes. Give sketches showing the action of the machines used in each of the above processes.

5. Compare, with sketches, the roller-head, blanket-head, angle-iron, and air-knife methods of coating. To which media are each of the above most suited and why?

6. Discuss what considerations would guide your choice between calendering and paste spreading in the application of a polyvinyl chloride coating to a cloth, with special reference to the effect of the processes used in each case on the stability of the pigments.

Make a sketch of a typical calender used for vinyl coating.

7. Discuss the respective merits of drum curing, festoon curing, and cold curing in relation to the stability of pigments used in the rubberproofing of an indiana for the garment trade.

8. Give a sketch of the apparatus used in applying a grain to the surface of either a nitrocellulose-coated or a plastic-coated fabric and give some of the methods employed to ensure that the grain is satisfactory for subsequent antiquing.

9. What are the more usual defects encountered in the antiquing (double effecting) of nitrocellulose-coated fabrics? State what effect the degree of dispersion of the pigment in the lacquer has on the final result.

10. Plastic-coated fabrics may be decorated by printing. Give a sketch of a typical printing machine for the application of a single colour print.

What subsequent processes would you apply to ensure stability of the print?

11. "The profit in making leathercloth depends on the efficiency of its solvent recovery plant." Discuss this statement in view of the increasing use of polyvinyl chloride coatings, and give a description, with sketches, of a modern continuous recovery system

12. Describe the application of (*a*) shellac finish **and** (*b*) casein finish to a rubberproofing.

What influence would these processes have on the choice of pigment for the coating?

13. Describe the construction and the operation of the essential parts of a machine designed for the application of a coating to a fabric base by the spreading technique. Include an outline of the associated equipment required for spreading solvent-borne materials. What steps are necessary to control the fire hazard when inflammable solvents are used?

14. Discuss the economics of the various methods used to remove cloth faults and cotton seeds from fabric before it is coated.

Paper E

10 a.m.–1 p.m. on Saturday, 16th June 1956

(**Either** Paper (i) **or** Paper (ii) to be attempted)

(i) Analytical and Testing Techniques

(*FIVE questions only to be attempted*)

1. Describe one possible system for the identification of the polymer upon which a coating is based; the procedure should be founded on a preliminary examination with a range of solvents, and appropriate chemical analytical procedures. Assume that the material is received in the form of a coated cotton fabric.

2. Comment on the methods available for measuring any **two** of the following—

(*a*) Gloss
(*b*) Flex-life
(*c*) Tear strength
(*d*) Void volume of a pigment powder
(*e*) Hiding power or opacity of a pigment.

3. "An experienced colour matcher is still more efficient, and a better economic proposition, than any available instrument." Discuss this statement, and comment upon its validity.

4. Compare the available methods for measuring the viscosity of (*a*) a lacquer **and** (*b*) a spreading paste. Discuss, briefly, how non-Newtonian data may be interpreted in terms of the spreadability of a paste.

5. Outline the systematic classification, and if possible identification, of an unknown red pigment in powder form.

6. Discuss in detail the test methods laid down in *B.S.* 2601-3 : 1955 — *Coated Fabrics (Leathercloths) for Upholstered Furniture (PVC, NC, and LO types)*.

7. Answer any **two** of the following—

(*a*) Give two methods for the quantitative determination of the components of a mixture of acetone, benzene, and ethanol. One method should be based on chemical reactions, the other on distillation.

(*b*) Outline a semi-micro procedure for the identification or classification of a plasticiser for polyvinyl chloride alleged to give compounds of outstanding cold-flex performance.

(*c*) Describe fully how you would estimate trace amounts of (i) copper in natural rubber **and** (ii) zinc in polyvinyl chloride. In what circumstances might these be of importance?

(*d*) Describe the test methods associated with the following names—

(i) Clash and Berg
(ii) De Mattia
(iii) Bundesmann.

Indicate their usefulness in connection with the coated fabrics industry.

8. How may the following metals be detected and determined in a vinyl coating— barium, cadmium, calcium, copper, chromium, iron, lead, manganese, tin, and titanium?

Which of these metals would you expect to be associated with polyvinyl-chloride-based coatings of the following colours— white, black, clear scarlet, blue–red, orange, yellow, royal blue, dark brown?

9. What test would you apply to control the manufacture of coated fabrics? How do "control" and "type" tests differ, and how would you apply them to a specific product? State in detail the precautions necessary in the selection of a test sample and in the arrangement of test specimens taken from it.

(ii) Organisation of Production and Economics

(*SIX questions only to be attempted*)

1. Process charts are now commonly used in method study practice. Describe a process chart and explain how it is used to make process improvements.

2. Describe some of the means by which the Government has influenced Private Industry since 1945.

3. How is the final selling price of a yard of coated fabric arrived at? What are some of the difficulties which arise when different products and qualities are manufactured by one concern?

4. What are the advantages and the disadvantages in holding finished or partly finished stock, and how would you decide whether or not to hold finished stock of a typical coated fabric?

5. Coated fabrics can be made by calendering, coating from solution, coating from paste, extrusion, or the lamination of an unsupported sheet to a base fabric. Discuss the economics of manufacturing by these methods in the case of the coating of a fabric with a plasticised polyvinyl chloride composition.

6. What fuels and methods of heat transfer are used in the coated fabrics industry? What are the relative merits of each method from the point of view of cost?

7. The coated fabrics industry has been faced with competition from plastic materials not made on a woven cotton base. Discuss this statement, indicating the present trends and what factors have influenced them.

8. Maximum utilisation of machinery often cannot be achieved at the same time as maximum productivity of manpower. Illustrate this from your own experience and describe how the optimum balance can be determined.

9. As the works manager of a small factory making coated fabrics, detail briefly the information you would like supplied to you by supervisory and clerical staff, to ensure that the factory is operating at maximum efficiency. Give some indication of how frequently you would like the information supplied.

10. Describe how you would set up a colour control section in a process laboratory in a factory making coated fabrics.

11. In a factory with a production organisation of general works manager, assistant works managers, departmental managers, foremen, and chargehands, describe the main functions and responsibilities of a departmental manager, a foreman, and a chargehand.

BRANCH 9—PRODUCTION OF DYES, LAKES, AND PIGMENTS

Paper C

Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.–1 p.m. on Friday, 15th June 1956

(*FIVE questions only to be attempted*)

1. How is diketen used in the dye, pigment, and intermediates industry? Explain the chemistry of its use in making 1-phenyl-3-methyl-5-pyrazolone.

2. What is the Skraup synthesis? Describe in detail the preparation of a dye intermediate which is based on this reaction.

3. Compare the behaviour of benzene, naphthalene, and anthraquinone on sulphonation.

4. Describe the methods available for converting diazo compounds into stable preparations which regenerate the diazo compound under conditions used technically in dyeing and printing.

5. Describe the various types of chemical structure possessed by dyes which enable them to form complexes with metals.

6. Compare the properties of titanium dioxide with those of the other commonly used white pigments. Give a summary of the various ways in which it is used.

7. Mention three important blue pigments belonging to different chemical groups. Compare their properties and uses.

8. What are the various methods of making iron oxide pigments? Outline the factors which influence the hue of the finished pigment.

9. What is meant by chelation? Give an account of chelate formation as applied in the production of pigments.

10. Discuss the effect of the physical properties of pigments (other than their colour) on the appearance of coloured substrates, with particular reference to particle size and refractive index.

Paper D

Industrial Procedures and Plant

2–5 p.m. on Friday, 15th June 1956

(*FIVE questions only to be attempted, TWO from Section I and THREE from Section II*)

SECTION I

1. Write notes on **three** of the following topics—

(*a*) Filter cloths—types and applications

(*b*) Rubber-lined steel vats compared with wooden vats in the preparation of soluble and insoluble azo dyes

(*c*) Steam for process heating

(*d*) The handling of 36% hydrochloric acid.

2. How would you plan and equip a laboratory, for both (*a*) checking intermediates and (*b*) exercising technical control in the manufacture of azo dyes? Assume that there is a staff of six and give a rough sketch of the layout proposed.

3. Write an essay on **either**—

(*a*) Fluid-energy mills in pigment grinding

or (*b*) Blending and standardising procedures in soluble dye manufacture.

4. Survey the plant in general use for filtering and drying in the dyemaking industry. Show how variations in the conditions of operation may affect the products, taking examples from the manufacture of **either** water-soluble dyes **or** pigments.

SECTION II

5. What hazards are involved, and what safety precautions should be taken, in handling each of the following materials—

(a) Concentrated sulphuric acid
(b) Caustic soda
(c) Aniline
(d) *p*-Nitroaniline
(e) Amines of the benzidine series
(f) Concentrated sodium hypochlorite solution?

6. Give an account of the plant and the procedures for the manufacture of—

(a) Basic acetate lead chromes from lead
or (b) Indanthrone from anthraquinone.

7. The pigment Red 2G is commonly prepared by diazotising 2:4-dinitroaniline in nitrosylsulphuric acid, diluting the diazo solution until the concentration of sulphuric acid is approx. 20%, filtering, and coupling with a suspension of β-naphthol. Give a more detailed account of this preparation, with particular reference to the plant and the materials from which it is constructed. What are the reasons for the somewhat unusual procedure?

8. Write an essay on—

(a) The dispersion of pigments in aqueous and oil media
or (b) Procedures used in diazotising and coupling.

Give special attention to the principles upon which these depend.

9. Outline one of the methods for the manufacture of copper phthalocyanine. What type of plant is used? Contrast it with that used for an azo system. Describe briefly the preparation of one phthalocyanine derivative suitable mainly for application to textiles.

10. Some inorganic pigments, white and coloured, are made by methods which include calcination, and others which call only for precipitation. Describe the manufacture of one pigment from **each** type of method. In the examples chosen, what are the important properties which affect suitability for paint-making, and how do manufacturing methods influence them?

Paper E

10 a.m.–1 p.m. on Saturday, 16th June 1956

(**Either** Paper (i) **or** Paper (ii) to be attempted)

(i) Analytical and Testing Techniques

(*FOUR questions only to be attempted*)

1. How would you determine the leuco indigo content of a sample of a commercial stabilised product? What impurities might be found in such a sample and how would you determine them?

2. What tests would you apply to a sample of lead chrome to establish its suitability for use in paints? Describe in detail how you would determine (a) total lead **and** (b) soluble lead.

3. Describe how you would assess the quality of commercial samples of **three** of the following—

(a) Aniline
(b) *m*-Phenylenediamine
(c) 2-Amino-1-methoxy-5-nitrobenzene
(d) J acid (2-amino-5-naphthol-7-sulphonic acid).

4. Describe the construction of a photoelectric absorptiometer and discuss the application of this instrument in the critical analysis of dyes and intermediates.

5. A is a sample of an organic lake sent to you by a customer: describe the steps you would take to identify the material and to compare its quality with the equivalent product offered by your own Company.

6. How would you determine the total sulphur content of a sample of desulphurised naphthalene?

7. Describe briefly the tests you would apply in order to establish the suitability of a sulphonated azo dye for (a) wool dyeing, **and** (b) colouring foodstuffs intended for export to the United States of America.

8. Write an essay on **one** of the following subjects—

(a) Potentiometric titrations
(b) The analysis of detergents
(c) The determination of the methoxyl group.

(ii) Organisation of Production and Economics

(*FIVE questions only to be attempted*)

1. Show diagrammatically how the production staff may be organised in a medium-sized dye-making firm, and indicate the responsibility and functions of each member.

2. Most dye and pigment concerns market a wide range of products, produced in more or less standardised plant. In such circumstances, what information would you require and what factors would you take into account in the planning of manufacture?

3. Outline the functions of the commercial manager, or his equivalent, in a medium-sized factory.

4. (a) Illustrate by means of a table the essential items in the make-up of a costing for a selected typical dye, lake, or pigment.

(b) Enumerate some of the factors which you would investigate in an endeavour to reduce the manufacturing cost of the selected product.

5. What do you understand by *planned engineering maintenance*? How is this achieved, and what complications are likely to be encountered in practice?

6. Write a short essay on **one** of the following—

(*a*) Work study

(*b*) The factory inspector

(*c*) Joint consultation.

7. Quality control is of paramount importance in the manufacture of dyes, lakes, and pigments. What steps are necessary to achieve it in routine manufacture? (Details of tests are *not* called for.)

8. Write a short essay on *Accident Prevention* with particular reference to the dyes, lakes, and pigment industries.

9. Differentiate between "day" and "shift" working and discuss briefly the economics of shift working in **either**—

(i) Dye manufacture

or (ii) Organic lake and pigment manufacture.

10. Write an essay on **one** of the following subjects—

(*a*) Incentive payments

(*b*) Industrial welfare

(*c*) The personnel officer.

Report of the Examinations Board

The examination was held on June 14–16th in Bradford, London, Manchester, Nottingham, and Paisley. There were 34 candidates, of whom 15 sat only for the first part of the examination (Papers A and B), 12 sat for the whole examination, and 7 took only the second part of the examination (Papers C, D, and E), having passed the first part in 1955.

The candidates came from more branches of tinctorial technology than in previous years, it being necessary to set papers in four branches, viz. tinctorial technology as applied to (i) textiles, (ii) paper, (iii) coated fabrics, leathercloths, linoleum, etc., and (iv) the production of dyes, lakes, and pigments.

The standard of the candidates was good: of those taking the first part, 17 passed and 12 failed; of those taking the second part, 17 passed and 2 failed. Signs were apparent, however, that candidates were tending to take the examination at too early a stage in their careers. This probably accounts for some of the failures in the first part of the examination, and there is no doubt that some of the candidates who took the second part would have done much better if they had had an extra year of study and practice.

Every effort was made to prepare papers of high quality and to ensure that candidates' answers were judged by a high standard, but it should be appreciated that success in the written examination is not the only criterion used by the Board in judging candidates, their history and their behaviour during the interview also being taken into consideration. The interview has proved particularly valuable in assessing the capabilities of candidates who, on the evidence of the written examination, were borderline cases. Many candidates created a bad impression before they even sat the examination by the careless and thoughtless way in which they completed their entrance forms. For a candidate to say that he is an assistant dyer without giving an indication of who is his employer, the length of his service, and what goods he dyes does not give a good impression of professional competence: indeed, as length of practical experience is one of the conditions for the award of the Associateship, to fail to give the necessary information betrays some lack of common sense. Candidates should give the fullest possible details of their careers, both academic and industrial, and failure to do so is a clear sign of inability to think clearly.

This lack of clear thinking showed itself also in the use by some candidates of undefined symbols and abbreviations, which made the examiners' work much harder. Again, all the examiners complained that candidates would describe when asked to discuss, and that they did not give the reasons for doing things unless these reasons were very obvious. Finally, the examiners made the complaint, made by examiners the world over and in all kinds of written examinations, of the poor legibility of some of the scripts. Usually it was the candidates who did not organise their thoughts and who were always scribbling against the clock who were the worst offenders, this being confirmed during the interviews. Fewer words, a more deliberate and systematic way of thinking, and more careful writing and spelling would place the sense of justice of the examiners under far less strain.

A number of candidates gave signs of having read more than they could digest or of having gone on to advanced reading without having fully assimilated the simpler basic work. Thus in some cases questions were answered most competently, the effect being spoilt, however, by ending with a statement which made plain that the candidate did not appreciate the basic principle involved.

This year only the candidates taking the second half of the examination were interviewed. Except in special cases, this procedure will be followed in future.

The reports of the examiners can be summarised as follows—

Paper A

SECTION I

Of the 27 candidates who took this paper 14 obtained more than 50% of the total marks possible and were considered to have reached a satisfactory standard. Eight candidates failed to earn 40%, and so were deemed unsatisfactory.

The other 5 candidates formed the 40–50% group, and were regarded as borderline cases. The "spread" of marks was very similar to that in the 1955 examination. Four candidates presented really good papers and obtained 70% or more marks; two or three were weak. The technique of answering the questions was generally better than in 1955, but still too many candidates wandered off into irrelevances without answering clearly the points arising from the question. For instance, the definition of an anionic surface-active agent asked for in Question 3 was not generally well done, and the term itself was used in a confused way; the essential difference between anionic and non-ionic agents was not well brought out. The "auxiliaries" question was not compulsory this year, but most candidates attempted it, with varying degrees of success.

SECTION II

In this paper 11 candidates obtained more than 50%; while 6 failed to earn 40%, and so were unmistakably unsatisfactory.

The general standard of the answers was fairly satisfactory, and it seems clear that the majority of candidates had followed a systematic course of study. It was pleasing to note that there was much less preoccupation with polymers of a purely textile nature than in previous years.

Although the rôle of free radicals in additive polymerisation was generally understood, some candidates did not understand what is meant by a *chain mechanism*. This, and a number of answers on methods of determining molecular weights and on the meaning of molecular weight distribution, suggested an inadequate background of physical chemistry. Much of modern high-polymer theory and practice is physicochemical, and a knowledge of physical chemistry is essential for its understanding. Most candidates appreciated the difference between *number-average* and *weight-average* molecular weights; and the meanings of such terms as *moisture accessibility*, *cross-linking*, and *suspension polymerisation* were generally understood. Many candidates realised the important effect of the close packing of chains on crystallinity, but the effects of chemical properties were not always clear, and, in general, discussion was not very good. Although there were a few fairly good essays, most candidates failed to realise that even a brief essay should possess order and form as well as some detail. Most essays dealt with copolymerisation, and only one candidate attempted an essay on the etherification of cellulose, confusing it with esterification. This, and the fact that no candidate attempted the question on the mechanism of the denaturation of proteins, may suggest that candidates, in their reading, had paid little attention to natural polymers other than those of a purely textile character.

Paper B

Seven candidates failed to earn 40% of marks and were considered unsatisfactory. The paper was attempted fairly well in general, although candidates appeared to prefer the purely descriptive type of question. Very good answers were given to the questions on colour blendness (11*c*) and dichroism (9); and while only 3 candidates answered question (4) (which demanded reasoning from first principles), they made excellent attempts marred only by evident uncertainty as to how fastness varies with depth of dyeing. On the other hand, the one question on colour and constitution (7) was attempted by only 5 candidates, and the replies were very poor. This confirms experience in previous examinations and shows no signs of improvement. It appears that neither are candidates being adequately instructed in this branch of the syllabus nor are they reading up the subject for themselves. Future candidates are recommended to write to the Society for the list of recommended reading in this field.

The most notable failure concerned the numerical question (12). Although no fewer than 21 candidates attempted this question, not one had sufficient initiative to plot the differences in optical density between the data for the pure and impure dyes. Had they done so, it would have been immediately apparent that the same impurity was present in both cases, that it was probably an anthraquinone derivative, and that sample A contained twice as much impurity as sample B.

Paper C

The candidates taking the Branch 1 (Textiles) paper provided answers of a quality which, on the whole, was not so high as in 1955. There was not much factual inaccuracy, nor was misunderstanding of questions very common, but there was a tendency (shared also by candidates taking the paper in other branches) to describe and not to discuss. Many candidates were fairly well informed about what may be called textbook matters but were not so up to date as might reasonably be expected of those at Associateship standard.

The result of including a group of questions on dyeing theory and related topics, one of which had to be answered, was disappointing. It seems as though more time will have to be devoted to study of this kind of subject. The poor quality of two of the three answers to Question 8(*b*) underlines this comment. There was, however, evidence that recently published papers devoted to explaining some of the fundamental concepts of dyeing mechanisms had been read and were serving a useful purpose.

Candidates taking Branches 4 and 6 (Paper and Coated Fabrics respectively) displayed sound knowledge of the colouring of the various substrates, but on the whole, while showing a grasp of basic principles, they tended to confine themselves to statements of a general nature and not to present information to the desired detail. Both in these two branches and in Branch 9 (Dyes and Pigments) there was evidence that candidates had confined their reading too rigidly to the particular field in which they were working, their knowledge outside that field being somewhat superficial. Thus one candidate in Branch 9 answered Questions 6 and 7 very ably, presumably being familiar with pigments. His other answers were not so good. Such a set of answers is not as satisfactory as one showing a wider grasp of the subject.

Paper D

In the Branch 1 (Textiles) paper 5 candidates obtained 65% or more marks, while 4 failed to obtain 50%, the other 6 candidates coming between these two groups.

The main faults of the candidates were— (i) The scope of the question was not covered in the answers. Thus in Question 1 the part dealing with the necessity for more than one method of setting polyamide and polyester fibres and the merits of each method was completely ignored in some cases. Again, that part of Question 12 asking where, e.g. with wool–regenerated protein fabrics, methods of processing differ from those used for all-wool goods was not adequately answered. (ii) In some cases the question set was not answered (rather did the candidate appear to make up his own question); e.g. in answering Question 2(*a*) some candidates gave very complete descriptions of matching lamps but made no comments about their use. This tendency was noticeable also in Question 13, where in some cases candidates contented themselves by a simple description of the application of azoic dyes to cotton, instead of detailing the precautions necessary to ensure the best fastness to rubbing and washing of azoic dyeings on cotton yarn and fabric.

In general the answers were disappointingly poor and in some cases showed complete lack of understanding of practical methods of dyeing; e.g. it was suggested that an all-cellulose acetate locknit fabric should be desized with an enzyme and that such a fabric should be jig-dyed. This lack of knowledge of common industrial practice was so apparent with some candidates that it would seem that they had not received adequate preparation, and had probably sat the examination hoping that luck might get them through, or else they had failed to appreciate the standard of knowledge necessary to pass the examination.

In Branches 4 and 6 (Paper and Coated Fabrics respectively) the general level was only moderate, and at times some candidates gave an impression of having only superficial knowledge. The paper in Branch 9 was fairly difficult, and in assessing the answers regard had to be paid to the paucity of information published on actual works processes for manufacturing dyes and pigments.

Paper E(i)

In Branch 1 (Textiles) only two candidates failed to obtain 60% of the marks, and on the whole they seemed to be better prepared for this paper than for any of the others. All who answered Question 6 described in detail the usual fluidity method for cotton, from which it would seem that they had never actually carried out this determination and did not know what 0·1 g. of cotton looks like. The fastness requirements demanded in Question 9 were on the whole not unreasonably assessed by half the candidates, but the replies of the other candidates suggested that they did not realise the relationship between end-use and the fastness grade it needs: otherwise, a candidate would not have stated that a light fastness of 6–7 is needed for women's costume cloths, of 7–8 for men's suitings, of 5 for blouses, and of 4 for awnings. The minimum fastness requirements to withstand average use could well be included in instruction about fastness testing.

It was surprising that the very easy question on statistical methods (1) was not attempted by any candidate. Following the examiner's experience of having set a simple statistics question for another examining body for eight consecutive years without obtaining a single answer, it would seem that the importance of these methods is not recognised by students.

In the question about the chromatographic analysis of dyes no candidate gave either the usual method of applying a small spot to filter paper and developing this with plain solvent, or the method of dissolving the dyed fibre as the simplest way of obtaining a solution of the dye present.

Paper E(ii)

The candidates attempting the papers in Branches 1 and 9 (Textiles, and Dyes and Pigments respectively) on the whole gave good answers and showed that they had a grasp of the elementary principles of organisation and of the economics of production. It is a pity that most candidates do not tackle this important subject. Many of them either are or hope to be employed in some managerial capacity, and study of organisation and control should be an essential part of their knowledge and training. There are several part-time courses to be taken in industrial administration at various technical colleges, and in addition the British Institute of Management has published many invaluable booklets, e.g. *Organisation for Output* and *Management for Production*, which show how the production side of a works is organised, the purpose of each member of the managerial staff, and its effect on the efficiency of production.

Lists of the candidates recommended for election as Associates or as having passed Papers A and B are given as an appendix to this report. [See p. 439.]

C. O. Clark (*Chairman*)
R. L. Elliott
W. Penn
C. B. Stevens
J. V. Summersgill
H. A. Turner
A. G. Tyler
T. Vickerstaff

Proceedings of the Society

Finishing of Fabrics containing Terylene Polyester Staple Fibre

N. M. MIMS

Meeting of the Huddersfield Section held jointly with the Huddersfield Textile Society at Huddersfield Technical College on 20th February 1956, Mr. J. Calvert in the chair

This paper describes some of the differences between the properties of Terylene polyester fibre and wool, discusses how these differences manifest themselves in finishing, and outlines the response to finishing treatments of fabrics containing Terylene staple fibre, both by itself and blended with botany wool.

INTRODUCTION

The fabrics at present produced in Yorkshire from blended yarns spun on both the woollen and the worsted systems are predominantly either blends of 50% or 55% Terylene with 50% or 45% botany wools or 100% Terylene polyester staple, although other blended fabrics containing major proportions of Terylene fibre are being manufactured. Fabrics produced from blended yarns spun on the worsted system are being used for the manufacture of men's suits, ladies' costumes, trousers, and ladies' pleated skirts, whilst those produced from woollen-spun yarns are confined at present to the manufacture of pleated skirts.

Whilst finishing processes are designed to improve the appearance and the handle of fabrics, they influence also fabric performance in wear, and with fabrics containing Terylene polyester fibre this aspect of finishing is of great importance. In particular, pilling may be greatly minimised by correct fabric finishing. There should, however, always be close co-operation between the spinner, the fabric designer, and the finisher, since, although there is much which can be done in finishing to give good fabric performance, it can have its maximum efficacy only when combined with correct fabric and yarn construction as well as correct choice of fibre.

PROPERTIES OF TERYLENE POLYESTER FIBRE

The physical properties of Terylene differ markedly from those of wool, as can be seen from Table I. Terylene staple fibre is about three times as strong as 64s wool, has about the same extension at break, but has a greater resistance to deformation under small loads. The moisture regain is low, and water has a negligible effect on the physical properties of the fibre. These properties are reflected in fabrics made from 100% Terylene, which are stronger than those made entirely from wool, resist distortion to a greater extent, possess less shrinkage in water at low temperatures, and are not greatly affected in their physical characteristics by the presence of moisture.

TABLE I

Properties of Terylene Staple Fibre

	64s Wool	Terylene Staple Fibre
Cross-sectional shape	Circular	Circular
Specific gravity	1·32	1·38
Dry tenacity, g./denier	1·4	3·5–4·0
Extension at break, % ...	38	40–25
$\frac{\text{Wet tenacity}}{\text{Dry tenacity}}$ ratio, % ...	76–97	100
Moisture regain at 65% R.H. and 25°C. (77°F.), %	16	0·4
Modulus of elasticity, g./denier	28	50–55

Terylene staple shrinks less than 1% in water at 100°C., but both staple yarns and fabrics will shrink owing to the relaxation of mechanical strains induced in the fibre during the various processing operations and to the recovery of fibre crimp, which is to some extent removed during spinning.

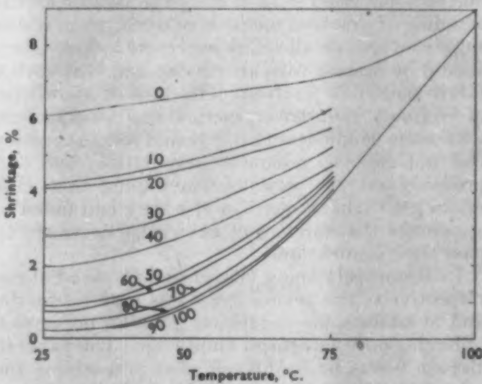


FIG. 1—Shrinkage in Water of Terylene–Wool Yarns (the figures on the curves give the percentages of Terylene)

The shrinkage of Terylene yarns, which is small at low temperatures, increases markedly as the temperature is raised. The shrinkage in water of wool yarns is high at all temperatures, and does not increase as rapidly as that of Terylene yarns when the temperature is raised (cf. Fig. 1). Blended yarns possess intermediate shrinkage characteristics, although the behaviour of a 50–50 blend is much closer to that of 100% Terylene than that of 100% wool.

The fibre is circular in cross-section and has a smooth surface, which contrasts with the broken, scaled surface of wool. It is to this smooth surface and the negligible plasticising effect of water on the fibre that the absence of milling shrinkage in 100%-Terylene fabrics is due.

Terylene is thermoplastic, and hence those textile-finishing treatments which entail appli-

cation of heat or of heat combined with pressure are of primary importance; whilst those which depend upon the action of water at low temperatures have little effect on the dimensions, stability, or performance of Terylene fabrics.

PRESETTING

Normal preparing treatments such as dry blowing, crabbing, and wet blowing may be used to stabilise fabrics containing Terylene staple fibre. All these treatments will reduce fabric shrinkage and distortion during scouring or dyeing, and they differ principally in the magnitude of the effects which they produce, dry blowing being the least severe.

With fabrics made from slubbing-dyed fibre or dyed yarns there is a danger that crabbing at the boil and wet blowing may cause some bleeding of dyes, and in general dry blowing only should be practised. There is also a danger, with fabrics which are to be piece-dyed, that overtreatment may produce local areas, corresponding to roller perforations, of lighter colour than the body of the fabric. Dry blowing is normally sufficient to obviate cockling and to reduce rope creasing during scouring. Table II gives some results which show the effect of dry blowing on fabric shrinkage and thickness during subsequent finishing. Laboratory experiements have shown that dry blowing also influences the performance characteristics of Terylene fabrics; as the steam pressure at which a fabric is treated is raised, the crease recovery improves, whilst fabric stiffness is reduced.

All steaming treatments will tend to fix in the fabric any loom or other oil stains which are present. If a fabric which is oil-stained requires to be preset for any reason, any stains may normally be removed, before setting, by local spotting with an organic solvent.

SCOURING

Scouring of Terylene fabrics on a dolly machine in a good soap or detergent solution is a satisfactory process for removing dirt and other adventitious impurities. For fabrics which crease badly when scoured in rope form, open-width scouring may be advisable, although, as already mentioned, dry blowing in the grease will help to reduce this defect.

The shrinkage which occurs during scouring at low temperatures is lower than that on all-wool fabrics, and is generally not more than 1–2% up to 50°C. with fabrics containing 50% or more Terylene staple fibre (cf. Fig. 2).

Although fabric shrinkage is low, some consolidation does occur during scouring, which will cover any slight reediness of the fabric.

DRYING

Hydroextraction in a centrifuge or on a suction-slot extractor followed by drying on a tenter is satisfactory for fabrics containing Terylene staple fibre. Care should be taken not to overstretch the fabric in the tenter, since this flattens the weft yarns and gives to the fabric a lean handle. Partly owing to the low water imbibition of Terylene fibre, there is less water in a 100%-Terylene or a Terylene–wool fabric than in a 100%-wool fabric after centrifuging (cf. Table III).

One consequence of this difference between 100%-wool fabrics and those containing Terylene is that the latter require less drying, and it is possible that, if the tenter speed is set for wool, fabrics containing Terylene may be overdry before they emerge from the machine. Any overdrying which occurs may adversely affect the handle of fabrics, and if the temperature of the fabric in the tenter rises too high this may lead to bleeding of dyes.

TABLE II

Variation in Dimensions during Finishing of 100%-Terylene Hopsack Fabric*

Treatment	Dimensions: Warp	Dimensions: Weft	Dimensions: Thickness (in.)	Control† Dimensions: Warp	Control† Dimensions: Weft	Control† Dimensions: Thickness (in.)
Loom-state	100	100	—	100	100	—
Scoured at 40°C.	100·7	99·4	24·5	100·7	99·4	24·5
Cropped and dry-blown ...	100·2	99·8	21·6	—	—	—
Dyed, cropped, and dry-blown	97·4	97·8	23·1	94·0	94·6	27·3

* 2/40s worsted-count yarn; 3-denier 4½-in. staple fibre; loom sett 70 × 60

† With the cropping and dry blowing before dyeing omitted

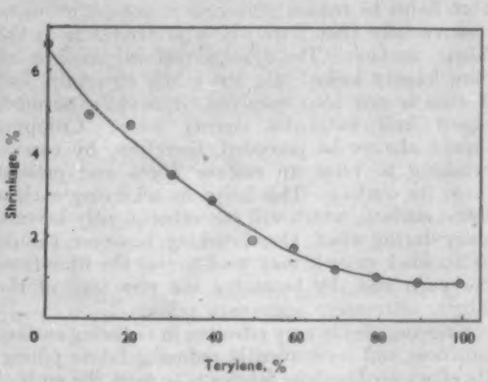


FIG. 2— Effect of Terylene Content on Shrinkage in Water at 50°C. of Worsted-spun 2/40s Terylene–Wool Yarns

TABLE III

Moisture Retention after Hydroextraction

Terylene (%)	Wool (%)	Weave	Finished Sett	Count Warp	Count Weft	Moisture Retention (%)
100	—	Plain	50 × 44	2/42s worsted	2/42s worsted	6·4
55	45	Plain	52 × 47	2/44s worsted	2/42s worsted	12·8
—	100	2 × 2 Twill	58 × 48	approx. 1/30s Y.S.W.*		22·3

* Y.S.W. = Yorkshire Skeins Woollen count

REMOVAL OF SURFACE FIBRE

The removal of surface fibre is the most important single operation in the finishing of fabrics containing Terylene. If fibres remain on the surface of a fabric after finishing, they will become entangled as a result of the abrasion which occurs during wear, and unsightly pills will form. Fig. 3 illustrates the importance of the removal of surface fibre and shows the amount of pilling which can occur on a fabric when no fibre is removed, compared with the pilling of a completely finished fabric.

Cropping is an efficient process for the removal of fibre. Because, however, Terylene is stronger than wool, it is also more difficult to cut, and it is essential that the cutting blades of cropping machines are in good order and properly adjusted. Several passages through the machine in both directions are normally necessary to achieve a satisfactory result. Although removal of surface fibre helps to reduce pilling, it is not sufficient to remove only that fibre which protrudes from the fabric surface. There is a certain amount of fibre loosely locked into the fabric structure, and if this is not also removed, it rapidly becomes raised and entangles during wear. Cropping should always be preceded, therefore, by careful brushing to raise up surface fibres and present them for cutting. This helps in achieving a clear fabric surface, which will not subsequently become hairy during wear. Overbrushing, however, should be avoided, since it may tend to tear the fibre from the yarn and, by loosening the structure of the fabric, ultimately aggravate pilling.

Singeing also is very effective in reducing surface hairiness and consequently reducing fabric pilling. Its effect on Terylene fabrics is to melt the ends of the fibres which protrude from the fabric surface. This thickens the fibres and leads to some harshening of the handle, although this may be reduced by prior removal of most of the surface fibre by cropping. Fabrics should never be singed before piece dyeing, as the globules of polymer formed during singeing dye darker than the rest of the fibres composing the fabric and give rise to a speckled appearance.

Flame singeing is usually to be preferred to plate singeing, since it gives better penetration of heat into the fabric. With plate singeing the effect is mainly confined to the surface of the fabric, and there is also a danger that permanent glazing of the fabric may occur.

On Terylene–wool blended fabrics it is normally necessary to scour after singeing in order to remove charred and degraded wool and to restore to some extent the fabric handle. This treatment raises some new fibre to the fabric surface, and a further brushing and cropping operation is desirable. The best results have been obtained by brushing and close cropping both before and after singeing, and Fig. 4 shows the effectiveness of various combinations of dry finishing operations in reducing fabric pilling as tested in the laboratory.

For Terylene–wool blended fabrics made from woollen-spun yarns, which are more prone to pilling than those made from worsted-spun yarns, singeing has been found to be practically essential for the production of fabrics of satisfactory performance.

For suitably constructed fabrics made from twofold worsted-spun yarns, brushing and cropping alone may be sufficient to reduce pilling to an acceptable level, but flame singeing may always be used with advantage.

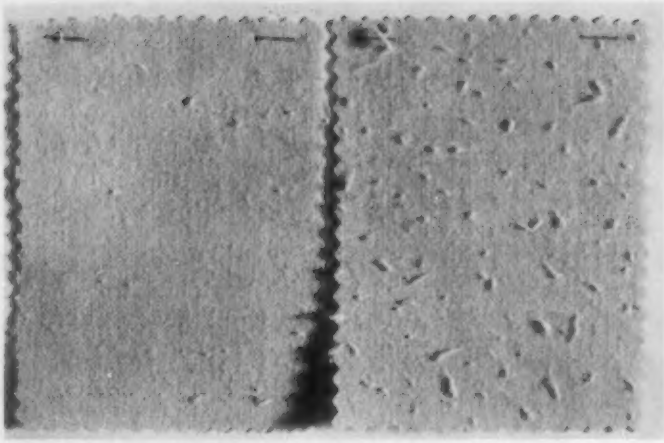
DRY BLOWING, ROTARY AND HYDRAULIC PRESSING

Dry blowing is a satisfactory final process in finishing Terylene piece goods, and the effect which it has on Terylene fabrics has been discussed already. Care should be taken that there are no creases in the fabric as it is run into the blowing machine, as it will not be possible to remove completely any which are fixed during this treatment.

The effect of rotary pressing is to produce a heavy shine on Terylene fabrics, which, unlike that on wool, cannot be removed by open steaming. This operation should, therefore, be avoided on woollen- and worsted-type fabrics, except where such an effect is specifically required.

Hydraulic pressing may be employed on fabrics containing Terylene, but here, also, shining may occur. Any shine will not be readily removed from 100%-Terylene pieces, although a slight shine on a Terylene–wool piece may possibly be removed by steaming.

Heat and pressure finishing can modify the properties of fabric containing Terylene. Table IV shows the effect of some finishing processes on the crease recovery, stiffness, thickness, and dimensional stability of a 100%-Terylene fabric and a 55 : 45 Terylene–wool blended fabric; rotary pressing, whilst not a recommended process for fabrics containing Terylene, has been included for comparison with dry blowing. Fabric crease recovery improves during finishing but is not significantly affected by the final heat treatments. Fabric stiffness (flexural rigidity) is only slightly affected by the treatments. Pressure during rotary pressing affects fabric thickness, and temperature influences the stability to steam pressing of the blended fabric. The 100%-

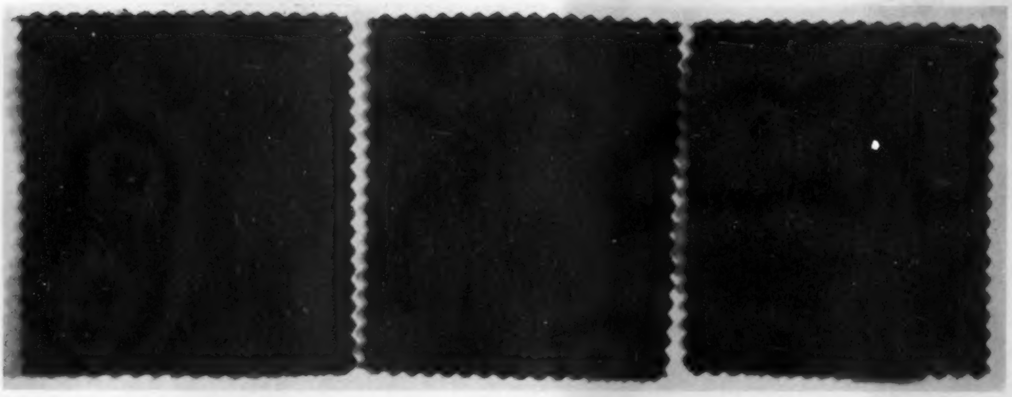


Finished as follows—

(1) Scoured (6) Scoured
(2) Cropped (7) Cropped
(3) Blown (8) Blown
(4) Pressed (9) Pressed
(5) Singed

Not singed or cropped

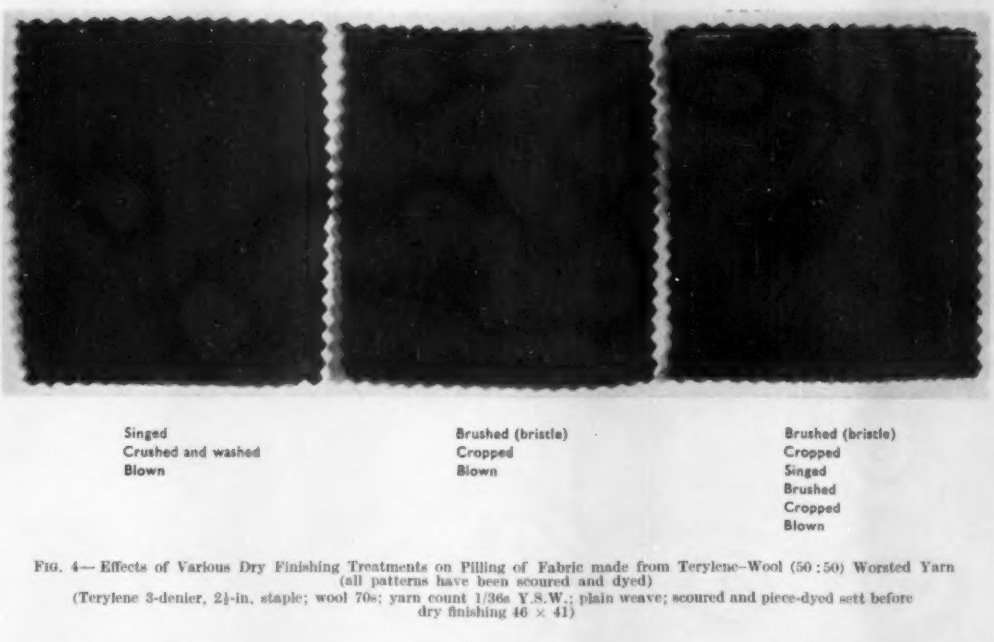
FIG. 3— Effect of Removal of Surface Fibre on Pilling of Fabric made from Terylene–Wool (50 : 50) Yarn (Terylene 3-denier, $2\frac{1}{2}$-in. staple; wool 70s; yarn count 1/30s Y.S.W.; plain weave; sett after wet finishing 48 × 40)



Singed
Blown

Brushed (bristle)
Cropped
Singed
Blown

Singed
Brushed
Cropped
Blown



Singed
Crushed and washed
Blown

Brushed (bristle)
Cropped
Blown

Brushed (bristle)
Cropped
Singed
Brushed
Cropped
Blown

FIG. 4— Effects of Various Dry Finishing Treatments on Pilling of Fabric made from Terylene–Wool (50 : 50) Worsted Yarn (all patterns have been scoured and dyed)

(Terylene 3-denier, 2½-in. staple; wool 70s; yarn count 1/36s Y.S.W.; plain weave; scoured and piece-dyed sett before dry finishing 46 × 41)

TABLE IV

Effect of Finishing on Fabric Properties

Finishing Procedure		55 : 45 Terylene–Wool Gabardine (woven from 2/48s worsted-spun yarn) (loom sett 108 × 64)				100%-Terylene Plain-weave Fabric (woven from 2/44s worsted-spun yarn) (loom sett 49 × 47)			
		Thickness (mm.)	Flexural Rigidity (mg.cm.)	Crease-recovery Angle (°)	Shrinkage on Steam Pressing at 50 lb./sq.in. (%)	Thickness (mm.)	Flexural Rigidity (mg.cm.)	Crease-recovery Angle (°)	Shrinkage on Steam Pressing at 50 lb./sq.in. (%)
Unscoured control	Warp	0·88	902	133	5·0	0·58	559	110	4·0
	Weft				5·0				4·0
Scoured, hydro-extracted, and tentered (S.H.T.)	Warp	0·83	372	148·5	4·5	0·54	365	125	3·0
	Weft				3·2				3·0
S.H.T., rotary press 4000 lb.*, 110°c.	Warp	0·70	192	157	3·2	0·46	181	150	0
	Weft				1·2				0
S.H.T., rotary press 32,000 lb., 110°c.	Warp	0·57	272	—	2·4	0·38	178	148	0·5
	Weft				1·2				0·5
S.H.T., rotary press 20,000 lb., 100°c.	Warp	0·62	296	154	3·6	0·40	177	151	0
	Weft				1·6				0
S.H.T., rotary press 20,000 lb., 140°c.	Warp	0·63	333	157	0	0·35	110	150·5	0
	Weft				0				0
S.H.T., dry-blown 1 min., cooled 1 min. (minimum wrapper tension)	Warp	0·64	258	160	2·4	0·38	192	150·5	1·5
	Weft				3·0				0
S.H.T., dry-blown 1 min., cooled 1 min. (maximum wrapper tension)	Warp	0·62	230	159·5	2·0	0·36	192	150	1·5
	Weft				2·0				1·5
S.H.T., dry-blown 10 min., cooled 10 min. (maximum wrapper tension)	Warp	0·57	262	160	3·0	0·37	202	149	0
	Weft				1·8				0

* Machine 67 in. wide with cylinder of diameter 30 in. (Arthur Heaton & Co.); approx. 1700 sq. in. of fabric under press

Terylene fabric has, in all instances, better stability to steam pressing than the blended fabric, and all final heat treatments markedly improve stability to steam pressing.

MILLING

100%-Terylene fabrics will not mill owing to the smooth surface of the fibre and to the negligible plasticising effect of moisture. When Terylene fibre is added to wool, the milling shrinkage which may be obtained on either yarn or fabric decreases markedly, until with fabrics containing major proportions of Terylene staple fibre heavy milled effects cannot be obtained. Fig. 5 shows the milling shrinkage of a range of Terylene–wool blended yarns to illustrate this point, whilst Fig. 6 gives a comparison of the rates of milling of a 60 : 40 Terylene–wool blended fabric and a 100%-wool fabric in acid, soap solution, and water.

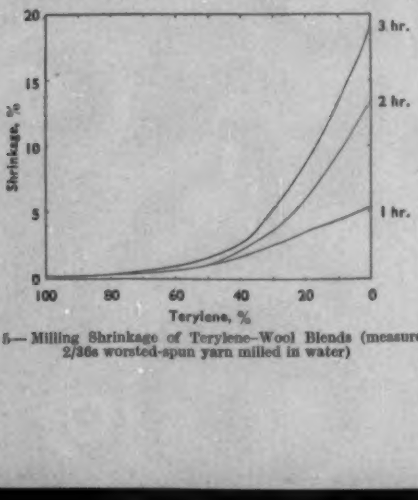


FIG. 5— Milling Shrinkage of Terylene–Wool Blends (measured on 2/36s worsted-spun yarn milled in water)

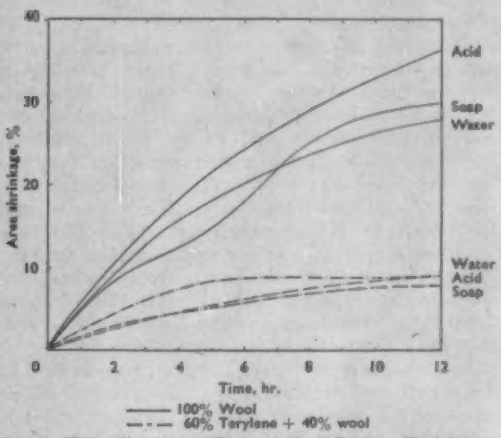


FIG. 6— Milling Shrinkage of Wool and 60 : 40 Terylene–Wool Fabrics (Terylene 3-denier, 2½-in. staple; wool 64s broken top; yarn count 1/24s Y.S.W.; 2 × 2 twill fabrics; loom sett 44 × 40)

From this it can be seen that both the rate and the final extent of milling are greatly reduced with the blended fabric compared with the all-wool one.

Although little shrinkage occurs on milling blends containing more than 50% of Terylene, some increase in fabric thickness occurs. This is probably due to preferential migration of the wool fibres to the fabric surface during milling. This gives to the fabric a nap of predominantly wool fibres, which can delay the onset of pilling when tested in the laboratory. This protection is, however, only temporary, and wearer tests have shown that pilling develops when the surface nap begins to be worn away.

WATER REPELLENCY

The best water-repellent effect is obtained on Terylene and Terylene–wool blended fabrics with the silicone finishes, but Quintolan W also produces a high initial water-repellent effect, particularly on the blended fabrics. In its fastness to washing and dry cleaning, however, the finish is slightly inferior, and this agent also has a green tinge, which may dull the shade of some coloured goods. Mystolene KP, a wax–casein proofing agent applied by the conventional technique, produces an inferior water-repellent effect of poor fastness on Terylene and Terylene–wool fabrics. The good fastness to washing and dry cleaning of the silicones and Quintolan W is dependent upon the complete removal of residual wetting agents during washing and the use of clean solvent free from dry-cleaning soaps in dry cleaning. Table V gives the results of some Bundesmann tests on proofings obtained with silicones, Quintolan W, and Mystolene KP.

TABLE V

Bundesmann Test Results* on Gaberdines

Proofing Treatment	Initial		Washed		Dry-cleaned in White Spirit		Dry-cleaned in Trichloroethylene		Weathered for 6 months	
	A†	P†	A	P	A	P	A	P	A	P
100%-TERYLENE‡										
Untreated ...	162	Full	—	—	—	—	—	—	—	—
Silicone	39	29	32	23	42	43	56	67	63·5	260
Quintolan W ...	67	186	73	203	40	38	50	86	110	370
Mystolene KP ...	102	Full	78	Full	118	Full	107	Full	106	370
55:45 TERYLENE–WOOL§										
Untreated ...	177	Full	—	—	—	—	—	—	—	—
Silicone	12	1·5	23	1·0	39	Nil	38	1·0	133·5	235
Quintolan W ...	46	11	56	27	45	4	44	21	‖153	370
Mystolene KP ...	106	Full	81	123	122	Full	119	Full	125·5	255

* *Test conditions*—
Water temp. 19°C.; 5°C. for weathering results
Rate of flow 70–72 c.c./min.

† A = Absorption (%)
P = Penetration (c.c.)

‡ Terylene 3-denier, 4½-in. staple; yarn count 2/48s worsted; 2 × 2 twill weave; loom sett 100 × 50

§ Terylene 3-denier, 4½-in. staple; wool 64s; yarn count 2/48s worsted; 2 × 2 twill weave; loom sett 100 × 54

‖ One result only

After weathering for six months (August 1955 to January 1956 at Harrogate) the water-repellent effect of all finishes is seriously reduced. This is attributed principally to the heavy soiling which occurred, and it has been our experience that removal of the soil restores the water-repellent effect.

In conclusion, the following composite finishing routine is suggested for Terylene and Terylene–wool fabrics, as it has been found to give satisfactory results on well constructed fabrics—

Preset if necessary
Scour and dye if required
Hydroextract and tenter
Brush and crop
Singe
Wash (for blended fabrics)
Brush and crop
Dry blow.

* * *

The author wishes to thank the University of Leeds and Professor C. S. Whewell for the facilities afforded in the Finishing Section of the Department of Textile Industries of the University.

IMPERIAL CHEMICAL INDUSTRIES LTD.
FIBRES DIVISION
HOOKSTONE ROAD
HARROGATE
YORKSHIRE

(*MS. received 11th April 1956*)

PUBLICATIONS SPONSORED BY THE SOCIETY'S FASTNESS TESTS CO-ORDINATING COMMITTEE—XX

Report on Early Work on Fixing Standards for Light Fastness

FASTNESS TESTS CO-ORDINATING COMMITTEE

Portions are reproduced of the first (1934) of the Society's reports on fastness tests, relating to the fixing of standards for light fastness.

PREFACE

The Fastness Tests Co-ordinating Committee feels that the work on fading by light which was carried out originally during 1928–1934 by the Society's investigators is not sufficiently known either in this country or abroad. One of the reasons for this is that the full report [1] was never published in the *Journal* and has long been out of print.

It is felt that the information should be made available, particularly in view of the present activity in this field by the Society and others. The Fastness Tests Co-ordinating Committee therefore publishes the report, with some omissions, in the form of a Sponsored Publication.

INTRODUCTION

The object of the work on fastness to light was twofold, namely to set up standards with which all other coloured materials could be compared, and to recommend a fading instrument which would reproduce as quickly as possible the results obtained in sunlight[*].

The standards which would eventually be chosen would be exposed in different parts of the world and therefore under a wide range of atmospheric conditions. Unless great care were exercised in the choice of dyes there would be a possibility that a range of standards which faded in a given order in one locality would fade in another order elsewhere. This is due to the fact that the degree of fading of different dyeings is influenced to different extents by the atmospheric conditions. The problems were thus—

(1) What are the factors in the atmosphere which are responsible for these differences in fading, and—

(2) When these are known, can a range of dyes be selected which are either uninfluenced by these differences, or, alternatively which are influenced to the same extent?

It was well known that the greater the amount of moisture in the air the greater the rate of fading, although very little had been published on the relative susceptibility of the different classes of dyes and of the variations within each class.

A few experiments had been carried out by the Wool Industries Research Association [2] which showed that the hitherto-held opinion that the fading of dyed textiles was uninfluenced by heat was erroneous. A third probable factor appeared to be the impurities associated with an industrial atmosphere, the chief of which was sulphur dioxide. Consequently it appeared to be essential that all samples which might be selected as standards should be tested for their reaction towards humidity, heat, sulphur dioxide and other gases.

There were other factors which were known to influence the fading, such as the intensity and spectral composition of the light, and additional ones were found during the course of the work.

A considerable amount of testing was therefore carried out in the laboratory, whilst during each of the summers 1928–1932 patterns were tested out-of-doors under practical conditions and in different parts of the world, the two sides of the work being complementary.

[*The policy of the Committee has changed since the issue of this report in 1934, and the Fastness Tests Co-ordinating Committee does not sponsor any fading lamp. In view of this, those parts of the report which relate to fading lamps have been omitted.]

LABORATORY TESTS

In order to carry out the tests on the influence of humidity and other factors on the rate of fading, it was necessary to have a source of light which was constant, relatively easy to maintain, and preferably, which resembled sunlight as closely as possible. The enclosed carbon arc was the only satisfactory source and a Fugitometer was therefore adapted to enable exposures to be made at two or more humidities simultaneously. For this purpose, the air pipes were disconnected and within each exposure box was placed one of three solutions, namely, saturated magnesium chloride, saturated cobalt chloride or water, which gave humidities of about 32%, 56%, and 100% R.H. respectively. In the later stages of the work the cobalt chloride was omitted. Other boxes contained a solution of potassium metabisulphite, in order to give an atmosphere containing a little sulphur dioxide. Pieces of each dyeing were exposed simultaneously to the different humidities and in the sulphur dioxide.

The degree of sensitivity to humidity was determined by exposing each pattern for two periods, one of which was double the other. If the fading at 32% R.H. for the longer exposure was equal to that at 100% R.H. for the shorter exposure, the humidity effect was recorded as "moderate", if less as "large" or "very large" according to the difference, and if greater as "small" or "very small". In order that a dyeing could be considered as a possible standard it had to fall in the "small" classification. (Some results were presented in the *Journal* [3].)

With regard to the influence of sulphur dioxide, no dyeing was passed with which the fading was either largely increased or decreased, or whose hue was appreciably altered.

Tests were also made for a change of hue by sulphur dioxide in the absence of light, since this gas sometimes comes into contact with goods in

storage, packing or transport. Samples were sewn to a frame of glass rods, suspended over a solution of potassium metabisulphite, the whole being contained in a bell jar and kept in the dark. After a week, the frame was removed, the patterns allowed to condition in the laboratory and then examined. As with the light tests, no dyeing was passed which showed a change of hue.

The temperature tests were carried out in double-walled glass vessels, through the annular space of which was circulated water from a thermostat, and in the bottom of which was placed a humidifying solution. Four of these vessels were used simultaneously, each pattern being exposed under the following conditions—

25° c. and 32% R.H.
25° c. and 100% R.H.
60° c. and 32% R.H.
60° c. and 100% R.H.[*]

COLOUR MEASUREMENT

The Guild Colorimeter was used to investigate some of the problems of fading. Several papers were published in the *Journal* [5], and in one of them a method was described by which "straight" fading could be measured and recorded, whilst in other papers the more theoretical aspects of fading were discussed.

A number of other instruments which were available for the measurement of colour were also examined. Since such apparatus either has to be very elaborate and costly, or does not give the required accuracy, the Committee was unable to recommend one.

DAYLIGHT TESTS

The daylight exposures were made in order to determine the behaviour of the dyeings in actual use and the variations which might occur in the amount and quality of fading in different localities. The patterns exposed were selected from those known by members to be satisfactory, and in addition, all those which were shown by the laboratory tests to be insensitive to humidity and other agencies.

It seemed very desirable that the standards should increase in fastness in a definite way, as this would enable a quick estimate to be made of the particular grade of fastness required for any purpose when the performance of another grade was known. The basis of selection which was adopted was, therefore, that each member of the range should be twice as fast as the previous one. The standards finally selected follow this order reasonably well up to the last two (No. 7 and 8), where the intervals are rather greater.

An outline is given in the following paragraphs of the progress of the outdoor exposures during the summer months of 1928–1932.

As was reported in the *Journal* in July 1929 [6], over one hundred dyeings on cotton, linen, viscose rayon, wool and silk were exposed during the summer of 1928 in various parts of England and abroad. The exposures were for three different periods and were carefully controlled by exposing only to strong sunlight as recorded by the Campbell–Stokes Sun Recorder, which is the standard instrument at meteorological observatories. The patterns were mounted on thin cards which were attached to a piece of cotton fabric, and the whole was placed on the ground in an open space free from shadows. The patterns were removed at night and at any time when there was not strong sunshine.

Under these conditions, the fading of many dyes was fairly reproducible in different parts of the world. Others, such as the basic and azoic dyes on cotton, were faded to a greater extent in England than in hot and dry countries, and these were shown by the laboratory tests to be very susceptible to moisture.

In 1929, exposures of wool, silk, cotton and viscose rayon were made under two different conditions of exposure. The first method was by sun hours, as in the previous year (at Falmouth and Bangalore, India). It was felt, however, that whilst this method was very satisfactory, in that the amount of light falling on the patterns, and therefore the amount of fading, was uniform, yet in works practice the constant watch on the patterns would involve too much time. It was decided, therefore, to carry out tests at Torridon and Clifford by days, irrespective of the amount of sunshine, and for this purpose special fading cabinets were made to the pattern of the Wool Industries Research Association (Barker and Hirst [7]). The work was reviewed in the "Interim Report, October 1930" in the *Journal* for January 1931 [8].

In the report it was stated that it was apparent from the exposures made in the years 1928 and 1929, that wool and silk gave more reproducible fades than did the cellulosic fibres, and that this was supported by the laboratory work which showed that moisture and other agencies had less influence on the degree of fading of wool and silk than on cotton, linen, and viscose rayon. The "Interim Report, October 1930" states that for these reasons it was proposed to eliminate all but one material on which to dye the standards of fastness, and wool was chosen. The problem was thus greatly simplified and the object was to find a graded series of standards in dyed wool only, each grade being represented, if possible, by three different hues.

It is a significant fact that the proposals made at the time by the Society's Fastness Committee have been subsequently used by prominent German and American organisations interested in the subject.

As a result of the work of the two years, it was possible to publish the names of dyes which, it was expected, would be satisfactory as standards. The list [9] contained the following dyes, which, after further tests, were accepted as standards—

[* A fuller account of these experiments has been given recently [4].]

Lissamine Violet 6BNS (*C.I.* 717)
Solway Blue RS (*C.I.* 1076)
Polar Red 3B conc.
Cloth Fast Red R
Kiton Fast Red 4BL.

The main energies of the investigators were now concentrated on wool dyeings in red, green and blue shades. A considerable number of patterns were tested in the laboratory for the influence of humidity, temperature, and of sulphur dioxide on the rate of fading of these dyes, and of the alteration of hue brought about by sulphur dioxide in the dark. The majority of the dyes which passed these tests were then exposed during the summer of 1930 at Torridon.

It was anticipated that, as a result of these exposures, a selection of standards could be made in red, green and blue shades. Although this was realised to a fair extent, there was not available a sufficient range of green dyes to form a complete series of standards of the required degrees of fastness. This colour was therefore abandoned. With the reds and blues, there remained a few gaps, and subsequent work was directed to filling these.

It will be appreciated that as the number of missing standards in the ranges was narrowed down, it became increasingly difficult to find dyes of just the right degree of fastness and with which the fading was not unduly affected by moisture or by atmospheric impurities.

Many of the dyeings exposed in 1930 were satisfactory while others required a slight alteration in depth in order to bring them to the fastness demanded by the projected series, namely that each member of the series should be twice as fast as the previous one.

In 1931, therefore, further exposures were made of the satisfactory dyes, some in three different depths, together with additional ones which appeared likely to fill the gaps. The tests were carried out at Falmouth, Manchester, Clifford (Wetherby, Yorkshire), Leeds, El Giza (Egypt), Cape of Good Hope (South Africa), and Bangalore (India). From these exposures, eleven out of the required fourteen standards (7 red and 7 blue) were found, there being no dyeing which was completely satisfactory for the fourth of the red series and for the two fastest members of the blue series.

Further search, therefore, had to be made and additional patterns were exposed during the summer of 1932 at 15 different places in England and abroad. From these tests a graded series of red and blue standards was chosen[*]. These dyeings fade in the correct order at all the different places. They have been exposed to sunlight in boxes containing air of high and low humidity and the fading is not greatly affected by moisture. They also fade in the same order when exposed either to strong sun only or to the all-weather test.

THE STANDARDS

The standards finally selected were as follows[†]—

No.	Red Standards[*]		Blue Standards	
2	0·5%	Acid Magenta IIS (ICI) (*C.I.* 692)	0·5%	Lissamine Violet 6BNS (ICI) (*C.I.* 717)
3	0·5%	Polar Red 3B conc. (Gy)	0·6%	Brilliant Indocyanine 6B (IG)
4	1%	Cloth Fast Red R (SCI)	1·1%	Polar Blue G conc. (Gy)
5	1%	Alizarine Rubinole GW (IG) (*C.I.* 1091)	0·5%	Solway Blue RS (ICI) (*C.I.* 1076)
6	1%	Kiton Fast Red 4BL (SCI)	2%	Alizarine Light Blue 4GL (S)
7	1·2%	Alizarine Orange A425 Powder (ICI) on zinc (*C.I.* 1033)	4%	Caledon Blue GCP 300 Powder (ICI) (*C.I.* 1113)
8	1·75%	Durindone Red B 400 Powder (ICI) (*C.I.* 1207)	3%	Indigosol Blue AGG (DH)

The Committee adhered to the established international practice of employing eight grades of fastness to light, No. 8 representing the highest grade. No standard is given for the most fugitive grade, but any dyeing which is not as fast as the first standard (No. 2 on the scale) is to be classified as 1.

In use, the standards are exposed together with pieces of the material to be tested, either the red set or the blue set or both being chosen, according to the colour of the test pieces. If the test piece fades to the same extent, as say Standard No. 3, then it is said to have a fastness of 3, and so on.

When all the standards are used, it is desirable to expose for a series of times rather than for one period only. This is because the standards cover a wide range of fastness and in the time taken to fade the last two to a slight extent, the first few are completely bleached, thus making the differences between them uncertain. A useful series of times in the industrial parts of England is 1, 4, and 16 weeks, or if more detailed information is required, ½, 1, 2, 4, 8, and 16 weeks may be used. Where fading is more rapid, as on the coast, the first period of exposure may well be ½ week, whatever series of times is adopted. It is not essential, of course, to expose for exact times when comparing samples with the standards, and the exposures given are suggested as a working guide only.

References

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[* At a later date it was decided that the blue standards would meet all needs, and the red standards were consequently withdrawn.]

[† The names of the dyes are those in general use in 1934.]

COMMUNICATION

The Photochemical Oxidation of Wool in the presence of Fluorescent Compounds

D. R. GRAHAM and K. W. STATHAM

A study has been made of the action of sunlight on wool treated with fluorescent brightening agents. The discoloration which occurs is due to oxidation of the wool and appears to be independent of the fluorescent agent used. There is considerable evidence to show that oxidation of the amino acid tryptophan is the main colour-producing reaction.

Introduction

In recent years, there has been an increase in the use of fluorescent brightening agents in the production of white textile materials. For wool this "optical bleach" is usually combined with a chemical bleach, e.g. hydrogen peroxide or sulphur stove. However, on exposure to sunlight, wool so treated, particularly when in a damp condition, becomes yellowish brown. This colour is darker than that of normal unbleached wool, and comparison with unexposed parts (e.g. folded parts) of the "optically bleached" material shows the contrast to be very great. It has been the cause of a large number of complaints from the public [1].

The action of light on proteins in general, and on the textile fibres silk and wool in particular, has received considerable attention. The production of a yellow discoloration on untreated silk and wool has been noted previously [2–4], but the time of exposure was often several days. In the case of wool treated with fluorescent brightening agents, however, considerable discoloration frequently occurs in bright sunlight in about 1–2 hr. when the samples are wet.

(I) Discoloration of "Optically Bleached" Wool in Sunlight

Very little work appears to have been done on this subject. Ingham [1] mentions that the yellow colour appears when the washed garments are dried in direct sunlight or by radiant heat. This seems to indicate that the presence of moisture accelerates the change, in agreement with previous work on the photochemical degradation of textile materials in general.

Summersgill [5] has noted that "rapid fading of fluorescent bleaching agents seemed to be most liable to occur on materials which were washed and then exposed to sunlight in a wet and strongly alkaline condition". He also mentioned that browning due to the formation of decomposition products seemed to occur only if an excessive amount of agent had been used.

The action of light on textile materials in general has been reviewed by Appleby [6]. Factors which appear to accelerate photochemical degradation of textiles are the availability of oxygen from the air or other source, the presence of moisture and acid, light of short wavelength, and the presence of certain dyes, particularly vat dyes.

EXPERIMENTAL

Materials

The wool used was a two-fold 28s yarn of 64s quality knitted into fabric. Before use the wool was given a scour in warm soap and ammonia, followed by a thorough rinse in water. Single squares of wool each weighing approx. 5 g. were used for the majority of treatments.

Numerous commercial fluorescent brightening ("optical bleaching") agents were examined in preliminary experiments, as well as the compounds 4-methylumbelliferone, 1-naphthylamine-4-sulphonic acid, 2-naphthol-6:8-disulphonic acid, and 4:4′-diaminostilbene-2:2′-disulphonic acid. On exposing to sunlight samples of wool, treated with these various agents to give approximately the same intensity of fluorescence, the rates of discoloration were almost identical. One of the commercial fluorescent brightening agents was therefore used as the standard fluorescent agent.

Where possible, the chemicals used were of AnalaR or similar specification.

Wool Treatments

(*a*) PEROXIDE BLEACHING—Unless stated otherwise, the wool was bleached with 2·5-vol. hydrogen peroxide at pH 8 and 40°c. in a 50:1 liquor for 2 hr. In most cases, this bleach preceded further chemical treatment of the wool, although sometimes this order was reversed.

(*b*) TREATMENT WITH FLUORESCENT BRIGHTENING AGENT—The wool was stirred at 100–120 r.p.m. for 30 min. in a solution containing 0·1% fluorescent agent and 1% formic acid, both on the weight of wool, at 40°c. and a 40:1 liquor ratio.

Exposure Conditions

The treated samples were mounted on white paper in a glass-fronted box and were exposed wet unless otherwise stated. Exposures were made only on bright sunny days, when the amount of cloud was small. They were normally made from about the middle of May to the beginning of September, as it was found that this was the only period when a rapid and consistent discoloration of the wool occurred.

Exposure behind glass is open to criticism, since Race *et al.* [7] found less degradation of wool behind glass filters than in unfiltered light. Also Waentig [8] found that the effect of light upon silk was due only to the short ultraviolet rays that could not pass through glass. We have found, however, that wool treated with a fluorescent brightening agent and exposed behind glass discolours in almost exactly the same manner as a sample exposed without glass. Exposure behind glass also prevents

deposition of atmospheric dirt, which in the early stages of this work made it difficult to observe the degree of discoloration.

Assessment of the Degree of Discoloration

The discoloration was produced mainly on the surface of the fabric exposed to sunlight and did not extend to the unexposed surface, except after prolonged exposure.

The time required to produce the discoloration is too short for it to be classified by the normal S.D.C. standards. Attempts to assess the discoloration by means of a reflectance colorimeter were not successful.

It has been necessary to estimate the degree of discoloration visually and use comparative terms where necessary. It should be emphasised that by "degree of discoloration" is meant the actual colour of the exposed portion and *not* the contrast with the unexposed wool.

EFFECTS OF CONCENTRATION OF FLUORESCENT AGENT, pH, AND MOISTURE CONTENT ON THE DISCOLORATION

Samples of bleached and unbleached wool were treated as before with varying amounts of fluorescent agent up to 1·0% (on weight of wool). Wet samples were then exposed to bright sunlight for 6 hr., by which time they were completely dry. Similar samples were sent to South Africa and exposed wet to bright sunlight for 2 days.

From the samples exposed in Leicester it was noticed that the greater the amount of fluorescent agent present the greater was the effect and that the bleached wool became more discoloured than the unbleached for each concentration of fluorescent agent. In the set exposed in South Africa all the samples had discoloured to almost the same extent, the maximum discoloration being only slightly darker than the darkest of the set exposed in Leicester.

This indicates that the rate of discoloration depends directly on the amount of fluorescent agent present on the wool and is greater for bleached than for unbleached wool. The final degree of discoloration, however, appears to be independent of the concentration of fluorescent agent used, being almost identical for unbleached wool without fluorescent agent and for bleached wool with high concentrations of fluorescent agent.

The pH at which the samples were exposed had a considerable effect on the rate of discoloration, and this effect varied according to the treatment the wool had received.

The slight yellowish tone of scoured but otherwise untreated wool was bleached in the early stages of exposure but later gradually turned brownish yellow. This took several days to occur under English exposure conditions, but was much more rapid in South Africa. These changes appeared to be independent of the pH of exposure, up to pH about 11.

If the wool had been treated with a fluorescent agent, however, the rate of discoloration was increased and was greatest at pH 1–2 and least at pH 8–9. Above pH 9 the rate of discoloration again increased, possibly owing to the action of alkali on the wool [9].

Wool bleached with hydrogen peroxide was discoloured more rapidly than untreated wool, the discoloration being least at pH 6–7. The rate of discoloration was very slow, however, in comparison with that of wool treated with fluorescent agent. The behaviour of bleached wool treated with fluorescent agent was affected by pH in almost exactly the same way as that of unbleached wool similarly treated.

The presence of water was found to accelerate the rate of discoloration to a very great extent, as samples treated with all the commercial fluorescent agents tested showed, when exposed dry, no appreciable discoloration in the time taken to produce severe discoloration on wet samples.

EFFECTS OF VARIOUS TREATMENTS ON RATE OF DISCOLORATION

(a) *Variation of Peroxide Bleaching Conditions*

Wool was treated with peroxide solutions of various strengths from 0·5 to 4·0 vol. at pH 4, 7, and 9 and at 40°C. for various times. The wool was then treated with fluorescent agent in the usual way and exposed in a wet condition to sunlight.

The rate of discoloration of samples bleached with hydrogen peroxide was proportional to the degree of whiteness obtained and did not appear to depend on the conditions used to obtain the bleach.

(b) *Effect of Pretreatments with Oxidising Agents*

Wool was treated with 1–3% by weight of Caro's acid, *N*-chlorosulphamic acid, peracetic acid, and a permanganate–hypochlorite mixture, then bleached, treated with fluorescent agent, and exposed in the usual way. There appeared to be no alteration in the rate of discoloration as compared with wool that had received no oxidative pre treatment.

(c) *Effect of Treatment with Reducing Agents*

(i) Sodium Bisulphite

Treatment with bisulphite reduced the rate of discoloration of the "optically bleached" wool. The concentration of bisulphite used affected the rate of discoloration and also the degree of whiteness up to about 10% by weight of reagent, but at higher concentrations there was little or no effect on either the rate of discoloration or the degree of whiteness.

The temperature of the treatment appeared to have little effect on the rate of discoloration.

Bleached wool was treated with the fluorescent agent, and then for 30 min. with 10% sodium metabisulphite at 40°C. in a 30 : 1 liquor at various pH values. A similar series of samples was prepared in which the bleached wool was treated with bisulphite before the fluorescent agent, and in a further series the bisulphite and the fluorescent agent were applied simultaneously.

These variations of treatment showed that the aftertreatment with bisulphite was slightly superior, and that for each treatment application of the bisulphite at pH between 4 and 6 gave the best results.

(ii) Other Reducing Agents

Various other reducing agents were applied to wool that had been bleached and treated with fluorescent agent. In no case were the results obtained on exposure to sunlight in a wet condition as good as those obtained with a sample treated with bisulphite at pH 5 after the application of the fluorescent agent.

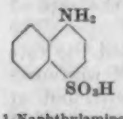
At this point in the investigation, tests were carried out in which the samples were washed in water at 40°C. for 10 min. On exposure in a wet condition, it was found that the effectiveness of the bisulphite treatment had been reduced, but the rate of discoloration was still considerably less than that of samples that had been treated only with fluorescent agent. After six water washes the intensity of the fluorescence had been reduced by about 10–20%, but the effectiveness of the bisulphite treatment was considerably reduced.

This would appear to suggest that the effectiveness of the bisulphite treatment is due, at least in part, to the presence of strongly adsorbed bisulphite.

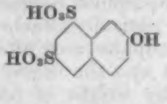
(II) Mechanism of Discoloration

Many of the reactions occurring when textile materials are exposed to light are considered to involve oxidation either by hydrogen peroxide or by activated oxygen[10]. The brown colour of the exposed wool also is probably due to oxidation, since the presence of reducing agents has been found to retard the rate at which the colour is formed.

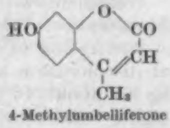
Since the final degree of discoloration produced appears to be independent of the presence of a fluorescent agent (p. 435), oxidation of the wool itself would seem to be a reasonable explanation for the discoloration. This is supported by the fact that several different fluorescent compounds produced exactly the same final discoloration, and it is difficult to see how compounds such as those listed below could produce a common coloured oxidation product—



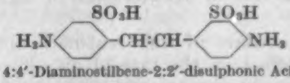
1-Naphthylamine-4-sulphonic Acid



2-Naphthol-6:8-disulphonic Acid



4-Methylumbelliferone



4:4′-Diaminostilbene-2:2′-disulphonic Acid

Saturated solutions of several commercial fluorescent agents were exposed to sunlight for several weeks. In all cases the fluorescence disappeared without the formation of highly coloured decomposition products. Wool was unchanged in colour after soaking in these exposed solutions.

Moreover, exposure of nylon and filter paper soaked with fluorescent agent produced no discoloration, whereas silk and wool so treated were considerably discoloured.

In an unpublished study of the action of various oxidising agents on the amino acids present in wool, we have found that the amino acids that most frequently gave coloured oxidation products are tryptophan and tyrosine. Weak colours are sometimes obtained with histidine and cystine, those given by histidine disappearing with excess of the oxidising agents.

It has been suggested recently that the brown colour formed on exposing silk to sunlight is due to oxidation of the tryptophan side-chains[11, 12].

EXPERIMENTAL

The materials and method of exposure were as described in Part I. The amino acids used were obtained from British Drug Houses Ltd.

Determinations of cystine and tyrosine were carried out by the methods of Shinohara[13] and Lugg[14] respectively after hydrolysing the wool with 5 N. hydrochloric or sulphuric acid at 125°C. in a sealed tube for 5 hr.

Tryptophan was determined by a modification of the method of Spies and Chambers[15]. Wool (30 mg.) was allowed to react at room temperature with a solution of 0·2 g. of *p*-dimethylaminobenzaldehyde in 18·5 N. sulphuric acid. After one week the wool had almost completely dissolved. The solution was filtered through a sintered glass funnel, and the colour developed with 0·01 M. sodium nitrite.

The wool used in this work contained 11·6% cystine, 5·7% tyrosine, and 1·0% tryptophan.

RESULTS

Solutions of the amino acids present in wool were exposed to sunlight in soda-glass test-tubes. The exposures were carried out in phosphate buffers at various pH values, with and without fluorescent agents. In neutral and acid solutions no discoloration occurred with any of the solutions on keeping in diffuse daylight or in darkness. Exposure to sunlight gave an intense brownish coloration, followed by precipitation, in a tryptophan solution containing fluorescent agent, but produced only a slight coloration when no fluorescent agent was present. Much weaker colours were obtained with cystine, tyrosine, and histidine, in the presence of the fluorescent agent. These colours may be due to oxidation products of the amino acids concerned, but could also be due to oxidation of tryptophan impurity, since the amino acids used were the L isomers and were presumably obtained from a protein source.

In alkaline solution, considerable discoloration of both tryptophan and tyrosine occurred on standing in diffuse daylight, and the influence of a fluorescent agent on the discoloration on exposure to sunlight was less obvious.

Solutions containing tryptophan together with each of the other amino acids present in wool were exposed to sunlight in the presence of a fluorescent agent. The sulphur-containing amino acids cystine and methionine appeared to have a very slight retarding action on the formation of the brownish colour. In one or two experiments proline appeared to increase the rate of discoloration slightly, but reproducible results could not be obtained.

The cystine, tryptophan, and tyrosine contents of various wool samples exposed to sunlight for 6 hr. are given in Table I.

TABLE I

Amino-acid Contents of Exposed Wool Samples

Sample	Degree of Discoloration	Amino-acid Content (% of that originally present) Cystine	Tryptophan	Tyrosine
Untreated wool	None	93	—	100
0·02% Fluorescent agent on untreated wool ...	Very slight	90	89	100
0·10% Fluorescent agent on untreated wool ...	Slight	—	86	—
1·0% Fluorescent agent on untreated wool ...	Heavy	90	61	100
Peroxide bleach	Very slight	86	86	100
Peroxide bleach + 0·02% fluorescent agent ...	Medium	83	73	100
Peroxide bleach + 1·0% fluorescent agent ...	Heavy	76	61	100

In no case has a loss of tyrosine occurred on exposure of wool to sunlight, and in a few cases an increase in tyrosine value of about 5% has been noted. This may be due to oxidation of phenylalanine to tyrosine, as Schocken[16] has observed some conversion of phenylalanine to tyrosine on ultraviolet irradiation of aqueous solutions.

A sample of bleached wool treated with a fluorescent agent was soaked in water and sealed in a glass tube. The tube was then exposed to sunlight for 2 days, by which time the sample was badly discoloured. On testing the condensate on the side of the tube for the presence of hydrogen peroxide, positive results were obtained with acidified potassium iodide solution and with titanic sulphate solution. The formation of hydrogen peroxide under such conditions has been noted previously. The simultaneous exposure to sunlight of tubes containing distilled water and an aqueous solution of the fluorescent agent resulted in the formation of hydrogen peroxide in both cases, and the amount formed appeared to be independent of the presence of the fluorescent agent.

A sample of bleached wool treated with fluorescent agent was dried at 110°c. for 3 hr. to remove as much of the absorbed water as possible. The sample was then sealed in a glass tube previously dried at 110°c. Similar samples of wool were dried as above but soaked in anhydrous petroleum ether or in water before being sealed into the tubes. The samples were then exposed to sunlight as before; only the sample soaked in water was found to be discoloured. The other samples were then treated with warm dilute hydrogen peroxide solution at pH 3 for 10 min., and the wool became discoloured, the degree of discoloration being similar to that produced by sunlight on the water-soaked sample. The discoloration was not obtained on treating the exposed samples with warm water or on treating with hydrogen peroxide an unexposed sample which had previously been dried at 110°c.

The influence of moisture on the rate of discoloration can be judged from the facts that the colour produced in 1–2 hr. on wet wool took 3–4 days to form on wool of normal regain and that with wool dried at 100°c. and exposed in a sealed tube no discoloration was observed after 14 days.

Discussion

The formation of a yellow colour on exposing wool to sunlight has been noted previously[2,4,17]. In most cases a connection has been inferred between this coloration and the observed reduction in the cystine content of the wool. In addition, Castiglioni[3] has suggested that the yellow colour produced when wool is exposed to ultraviolet radiation is due to the reaction of sulphuric acid, produced by photochemical oxidation of cystine, with cholesterol and related compounds present in the wool grease. The coloration produced in our experiments was not affected by prolonged ether extraction of the wool before treatment with the fluorescent agent, and treating the wool with an ethereal solution of cholesterol and allowing the ether to evaporate had no effect on the discoloration produced on exposure to sunlight.

The main potentially colour-producing amino acids present in wool are tyrosine and tryptophan. From the results in Table I it can be seen that there is no loss of tyrosine on exposure to sunlight but a considerable loss of tryptophan, and the amount of tryptophan destroyed increases as the degree of discoloration increases. The discoloration of silk on exposure to sunlight has recently been ascribed to the oxidation of tryptophan side-chains[11,12].

The discoloration appears to be produced by an oxidative process, since reducing agents are effective in slowing down the rate of discoloration. The formation of hydrogen peroxide during the exposure tests has been demonstrated, and it seems probable that this is the oxidising agent responsible for the discoloration. However, hydrogen peroxide bleaches wool, although it oxidises tryptophan to give a brown product.

The experiments in which the samples were exposed dry and then treated with hydrogen peroxide suggest that the reaction occurs in two stages. In the first stage, which can take place in the absence of water, a change occurs in the wool without the development of colour. This is followed in the second stage by oxidation of the changed wool by hydrogen peroxide. It is probable that the tryptophan is brought into a more reactive state by liberation of either the free amino acid or small peptides containing tryptophan. In this connection Carpenter[18] has suggested that during the ultraviolet irradiation of proteins the –CO·NH– groups adjacent to side-chains bearing chromophore groups undergo photolysis with liberation of the light-absorbing amino acid. This would imply that ultraviolet radiation is responsible for the change of tryptophan to a form in which it can be oxidised by hydrogen peroxide to give a yellow colour.

Tryptophan has absorption maxima at 2875 A.

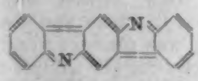
and 2780 A., and still shows slight absorption at 3000 A.[19]. Ordinary window glass transmits only 1–2% of light of wavelength 2950–3150 A.[20], and as only some 5% of the total ultraviolet component of sunlight has a wavelength of 3000 A. or less [21], it is unlikely that the direct action of the sun's ultraviolet rays is responsible for the liberation of the tryptophan from wool treated with a fluorescent agent. There may, however, be sufficient radiation of the required wavelength present to account for the slow discoloration taking place when wool is exposed to sunlight in the absence of fluorescent agents.

Since the presence of a fluorescent agent does not greatly affect the rate of formation of hydrogen peroxide, and since a sample of bleached wool, not treated with fluorescent agent, is discoloured only very slowly when exposed wet in a sealed tube, although hydrogen peroxide is present, it would appear that the function of the fluorescent agent is to accelerate the rate at which the tryptophan is liberated. The agent will absorb the incident light and be raised to an excited state. After a very short interval of time the excited molecule can return to its ground state either by releasing the whole of the excess energy as fluorescence or by transferring part of the energy to another molecule (in this case wool), the remainder of the energy being emitted as fluorescence. In order that the tryptophan can be liberated in the manner suggested by Carpenter [18], the fluorescent light must have a wavelength of under 3000 A. This would mean that the light emitted as fluorescence had a shorter wavelength than that of the absorbed light; i.e. the fluorescent agent would show anti-Stokes behaviour. This is unlikely to be the explanation, since anti-Stokes behaviour is the exception rather than the rule, and all the fluorescent compounds used (representing several different chemical types) behaved in a similar manner. The alternative explanation, that part of the energy of the excited fluorescent agent is transferred directly to the wool at or near the tryptophan residues, is a more likely explanation. This direct transfer of energy occurs more readily if there is some association of the two compounds involved. In some of the experiments involving the exposure of tryptophan solutions containing the fluorescent agent we have observed a tendency to form slightly turbid solutions, and in some cases the intensity of the fluorescence appeared to be decreased. Most of the fluorescent agents used are, however, only sparingly soluble in water, and it is possible that the observed effects were due to fluorescent agent being thrown out of solution by the tryptophan.

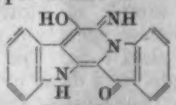
It was suggested above that the slow discoloration of wool not treated with a fluorescent agent was caused by the small amount of ultraviolet radiation of the required wavelength penetrating the glass. Wool, however, frequently possesses a faint fluorescence when examined under ultraviolet radiation, and it is possible that part of the wool or some impurity on the wool is acting as a sensitiser for the oxidation of tryptophan as suggested above. In support of this hypothesis is the fact that peroxide-bleached wool discolours at a greater rate than unbleached wool and also shows a greater fluorescence.

It is of interest that Lieben [22] found that the presence of the dye Rose Bengal, a fluorescein derivative, accelerated the oxidation in diffuse daylight of the tyrosine and tryptophan residues in albumen and casein. The tryptophan appeared to be oxidised much more readily than the tyrosine. Lieben does not mention the formation of a yellow colour during the reaction, but experiments we have carried out on albumen solutions exposed to sunlight in the presence of a fluorescent agent suggest that a colour was produced in his experiments.

The structure of the pigments formed by the oxidation of tryptophan is not known with any certainty. Fearon and Boggust [23] have suggested structures for two of the more definite oxidation products, urorosein and tryptochrome—



Urorosein



Tryptochrome

Urorosein and related compounds are formed by oxidation of compounds related to tryptophan with a variety of oxidising agents, including hydrogen peroxide.

The fact that the structures proposed contain two tryptophan residues supports the idea that one stage of the photochemical discoloration of wool is the liberation of tryptophan, since it is unlikely that the small amount present in wool is so distributed as to allow two residues to react together without first being liberated from the wool.

* * *

The authors wish to thank the Directors of Wolsey Ltd., Leicester, for permission to publish this work.

ABBEY MEADOW MILLS
LEICESTER

(*Received 21st February 1956*)

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CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents

Affinities of Vat Dyes

In a recent letter Valentine [1] discusses the effect of *ortho* substituents on benzamido groupings, and ascribes the reduced affinity of dyes containing such groupings to chelation between the amide group and the *ortho* substituent, with resultant decrease in the potential hydrogen-bonding power of the dye.

We have had occasion to examine derivatives of the dianilide of 1:4-dihydrocollidine-3:5-dicarboxylic acid with particular reference to their fluorescence. It was found that *para* substitution of the phenyl nuclei by methyl, methoxyl, or chlorine had very little effect, whereas substitution in the *ortho* position by chlorine or methoxyl caused a marked drop in the intensity of the fluorescence.

Here, too, a steric effect would be difficult to explain, chiefly because of the inactivity of the methyl group, and it is suggested that the observed effects are caused by chelation and a consequent reduction in the interaction of the amide group with the heterocyclic ring.

Unfortunately, we cannot provide quantitative data on the order of effectiveness, but in general our observation would appear to support Valentine's contention.

W. J. DE CORT

L. B. HOLLIDAY & CO. LTD.
HUDDERSFIELD

4th July 1956

[1] Valentine, L., J.S.D.C., 72, 286 (June 1956)

Informative Labelling

In view of the various discussions on informative labelling I think the following example collected from a multiple store in Oxford Street, London, is worthy of permanent record—

SWIM SUIT
FAST COLOUR
TO RELEASE ANY EVENTUAL SURPLUS DYE RINSE WELL BEFORE FIRST USE

The dyeing so labelled looked to be a heavy azoic bordeaux: if wringing as well as rinsing had been recommended, more "eventual surplus dye" might have been removed. The miracle fibres, however, deprecate wringing.

C. M. WHITTAKER

1 WEAPONNESS PARK
SCARBOROUGH

1st July 1956

Notes

Meetings of Council and Committees
August

Council — No meeting.

Deaths

We regret to report the loss by death of Mr. E. J. Honess and Mr. A. G. Tyler.

Election of Associates

At the meeting of Council held on 5th September 1956 the following were elected Associates of the Society —

BRANCH 1— TINCTORIAL TECHNOLOGY AS APPLIED TO TEXTILES

Ronald Beaumont
(*Leeds; Apprentice Dyer, Lunn & Mathers Ltd.*)

Jozef Biedawski
(*Mapperley, Nottinghamshire; Chemist, Dyehouse Department, British Celanese Ltd.*)

Harry Bilbie
(*Stainland, Halifax, Yorkshire; Apprentice Dyer*)

Enid Cornforth
(*Bradford, Yorkshire; Laboratory Assistant, The Geigy Co. Ltd.*)

John Neil Foulds
(*Halifax, Yorkshire; Assistant Technical Officer, Imperial Chemical Industries Ltd. Dyestuffs Division, Huddersfield*)

Ludomir Stanislaw Laskowski
(*New Basford, Nottingham; Assistant Chemist, Lace Research Association*)

Zygmunt Macheta
(*Blackley, Manchester; Laboratory Assistant, Imperial Chemical Industries Ltd. Dyestuffs Division*)

Nigel Geoffrey Morton
(*Halifax, Yorkshire; Apprentice Dyer, Bradford Dyers Association Ltd.*)

Fred Peach
(*Rochdale, Lancashire; in charge of Dyeing Laboratory, S. Heap & Son Ltd.*)

Edmund Przetakiewicz
(*Nottingham; Chemist, British Celanese Ltd.*)

Roy Stuart Sinclair
(*Glasgow; Research Assistant, J. & P. Coats Ltd., Paisley*)

Jeffrey Valentine Smith
(*Huddersfield, Yorkshire; Student, Huddersfield Technical College*)

John Bennet Swanston
(*Melrose, Roxburghshire; Assistant Dyer and Finisher, Scottish Woollen Technical College, Galashiels*)

BRANCH 4— TINCTORIAL TECHNOLOGY AS APPLIED TO PAPER

John Ralph Ainscough
(*Horwich, Lancashire; Research Chemist, Associated Paper Mills Ltd.*)

BRANCH 6— TINCTORIAL TECHNOLOGY AS APPLIED TO COATED FABRICS, LEATHERCLOTHS, LINOLEUM, ETC.

John Lunt
(*Wythenshawe, Manchester; Chemist, Imperial Chemical Industries Ltd. Leathercloth Division*)

BRANCH 9— PRODUCTION OF DYES, LAKES, AND PIGMENTS

Alan Kleiman
(*London; Assistant Colour Chemist, Pinchin Johnson & Associates Ltd.*)

The following candidates have satisfied the Examinations Board's requirements in Papers A and B at the Associateship Examination held in June 1956—

Donald William Hawtin Burtonshaw
Gustav Arne Hølmebakk
Reginald Neville Pineger
Alan Lomas Shackleton
Peter Burnett Shaw
John Arvon Thomas.

The Polish Dyemaking Industry

With reference to the final paragraph of the Note on the above subject in the August issue (J.S.D.C., 72, 382 (1956)) we are very happy to report that, through the good offices of the Polish Cultural Institute in London, the Society has now received a list of 262 homogeneous dyes at present being made in Poland. In a few cases the actual constitution is given, and all the other dyes are equated either with old *Colour Index* numbers or with former I.G. (German) dyes. C.O.C.

Oxalates from Bicarbonates and Carbonates by Exposure to β- or γ-Radiation

T. Hasselstrom and M. C. Henry of the U.S. Quartermaster Research and Development Command have found that, when aqueous solutions of various strengths of ammonium, calcium, and sodium bicarbonates and ammonium and sodium carbonates are exposed in polyethylene bags to β-radiation from a 2-Mev. van der Graaf electron accelerator, oxalates are formed. This happens also when the bicarbonates and ammonium carbonate are exposed to γ-radiation. The mechanism of the action, though complex, appears less complex than Wöhler's classical synthesis of oxalic acid from cyanogen. The presence of water and possibly also oxygen seems necessary to obtain the C–C bonding of the carbon dioxide moiety. C.O.C.

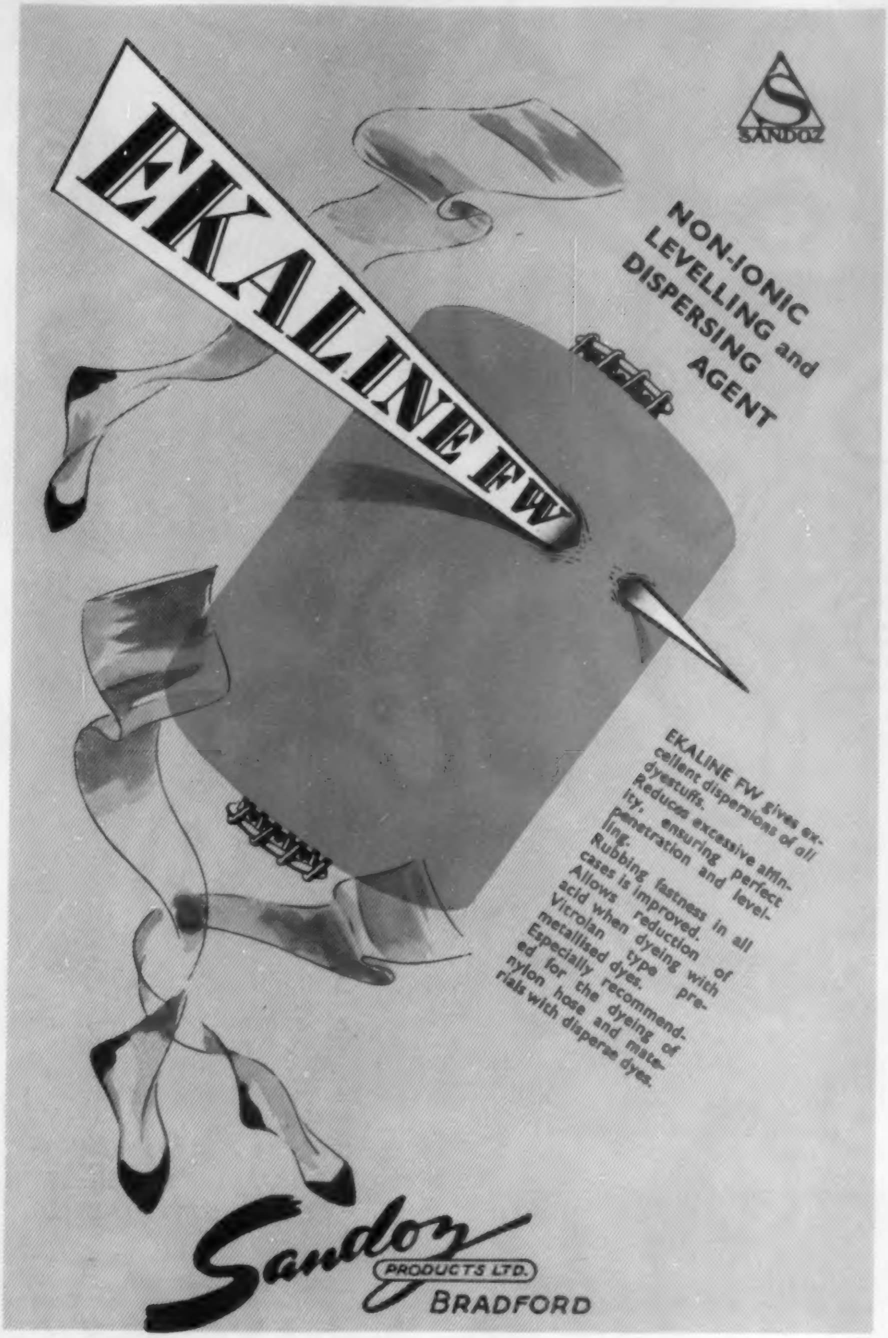
OBITUARY NOTICE

Charles Percival Tattersfield

It is with a feeling of great personal loss that the following all too brief tribute is paid to C. P. Tattersfield, whose sudden decease on 28th May 1956 at the age of 43 shocked his many friends throughout all sections of the textile and dye industries. Their deepest sympathy and good wishes are extended to his relatives, including his mother, widow, and three children.

He received his early training at Batley Grammar School and Bradford Technical College, where he gained high academic honours in the chemistry and dyeing courses, and also gained the Associateship of the Textile Institute. As a result of his substantial contributions to the knowledge of dyeing and finishing, and in particular his work relating to fibre blends, he was elected to the Fellowship of the Textile Institute in 1950.

He was author and joint author of numerous papers published in the *Journal of the Textile Institute* and the *Journal of the Society of Dyers and Colourists*, and also in the technical and trade press generally. He was in much demand as an able and experienced lecturer, and gave up a considerable portion of his leisure time to preparing and giving lectures to local sections of the Society and the Institute, and to various textile conferences, both national and international. Lectures which he gave during the last few years in America, Canada, and Scandinavia enhanced his reputation as a textile technologist who could always deal in a sound and practical manner with questions and problems ranging over many sections of the industry.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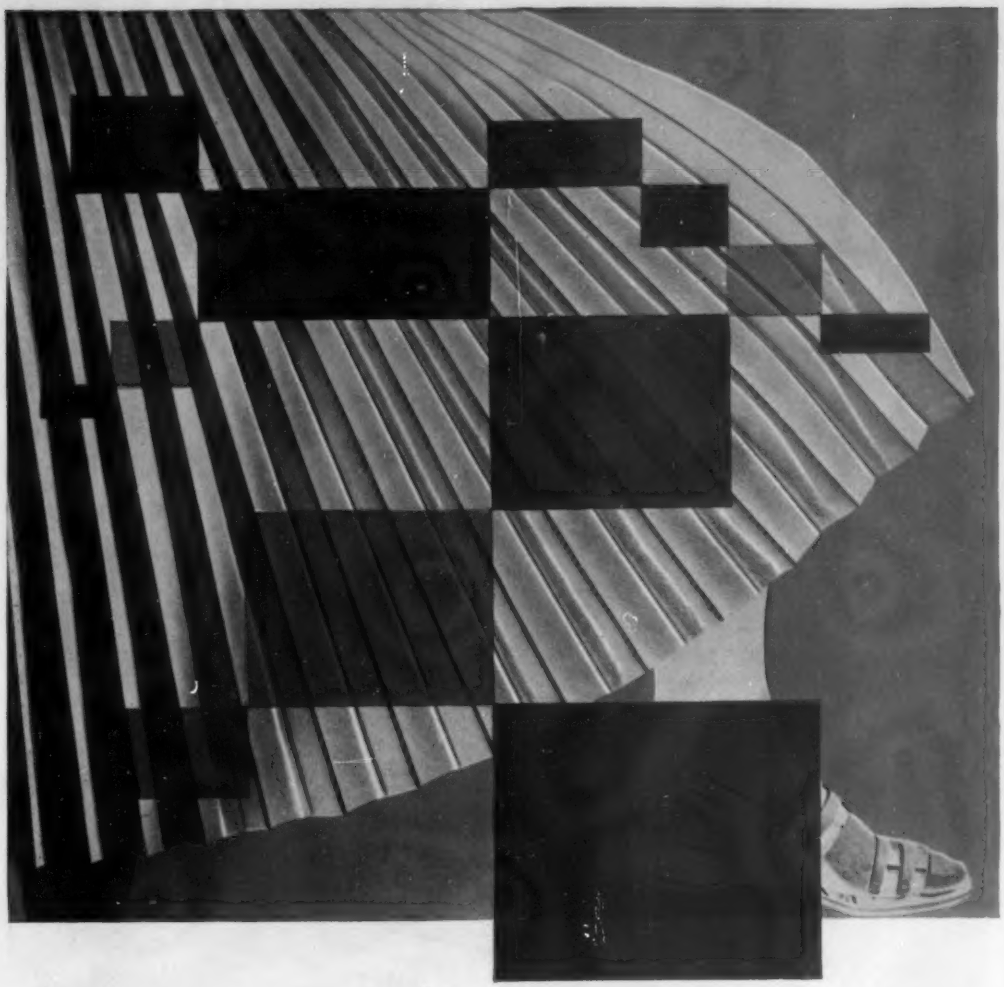

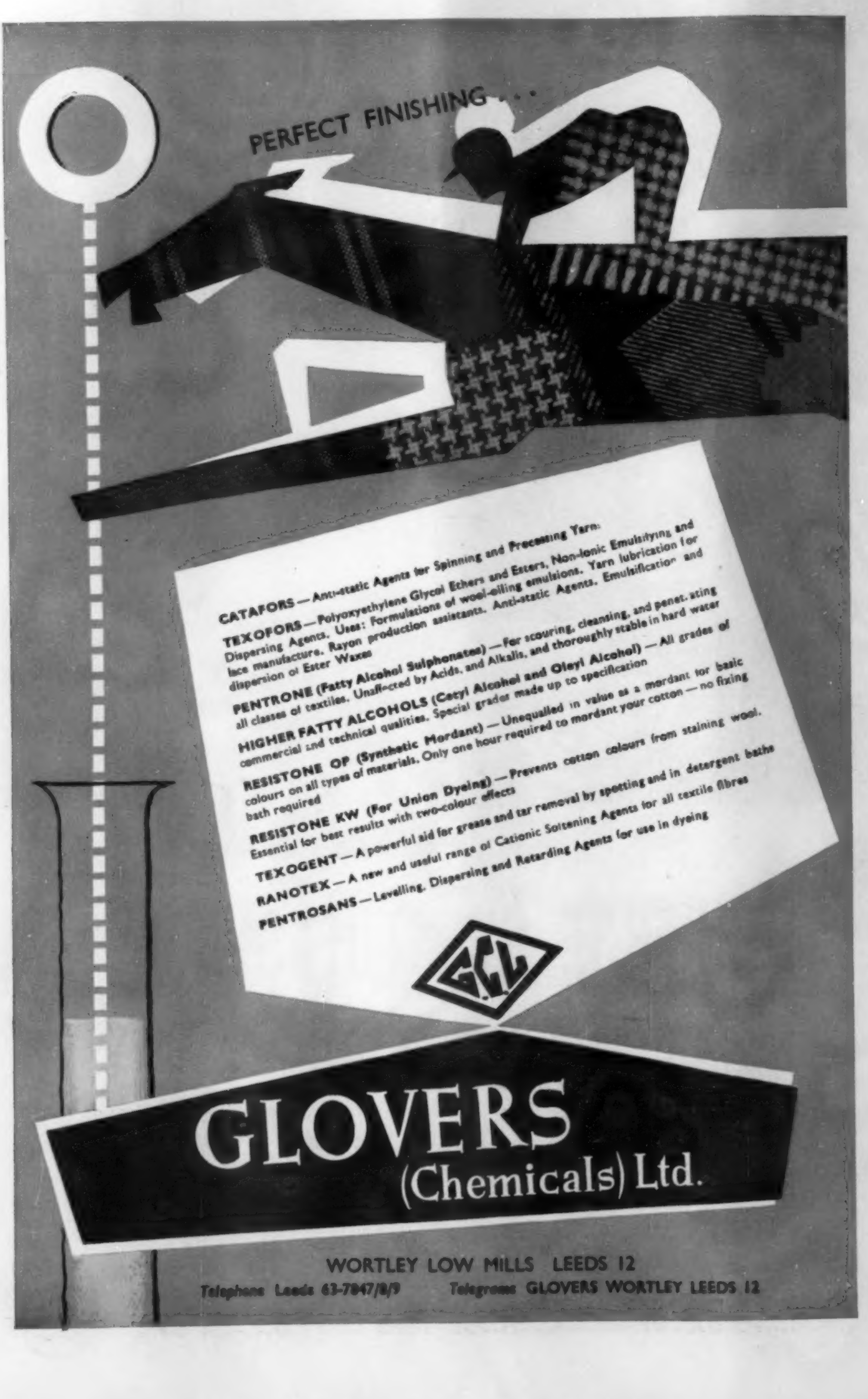
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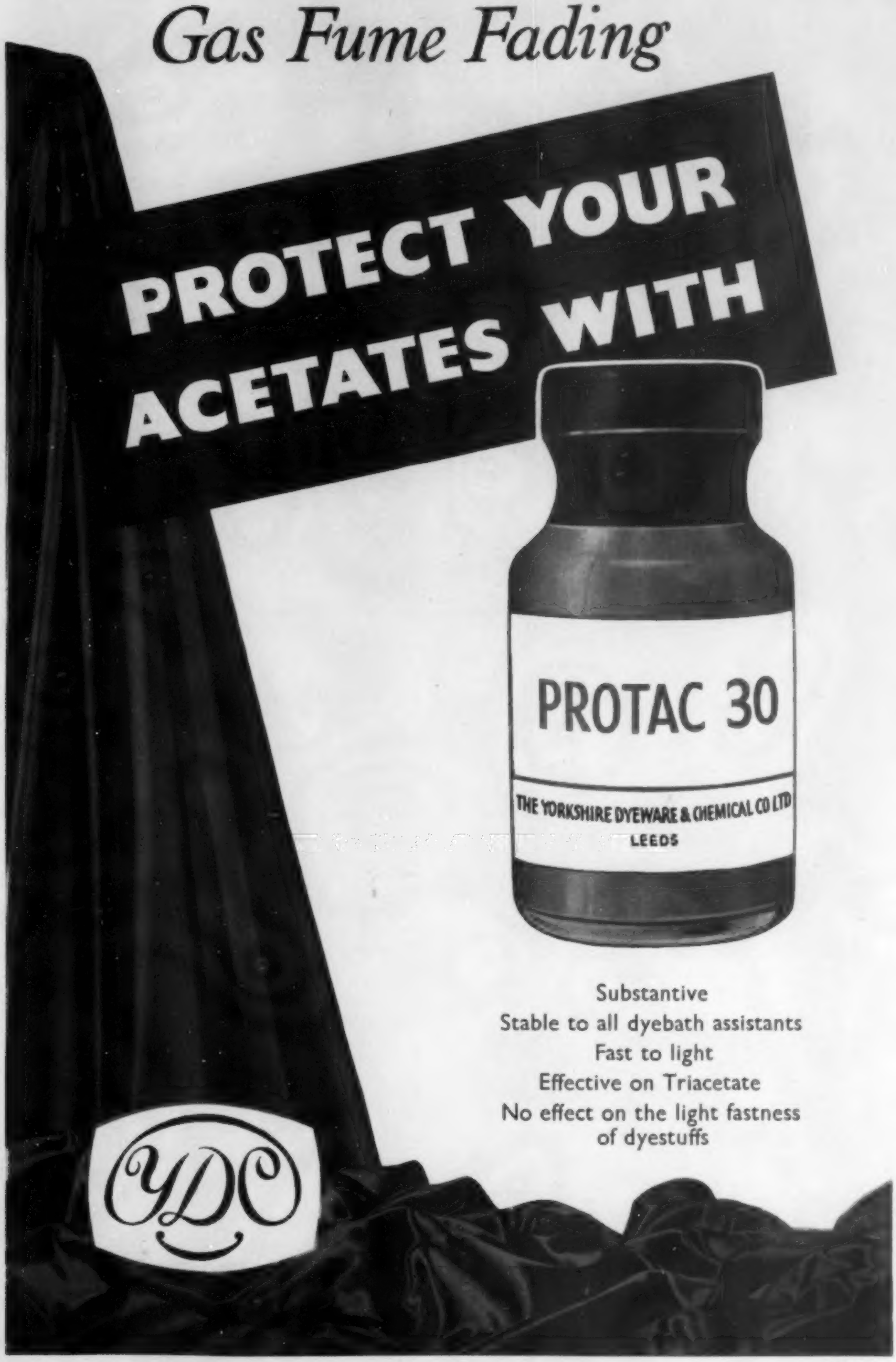
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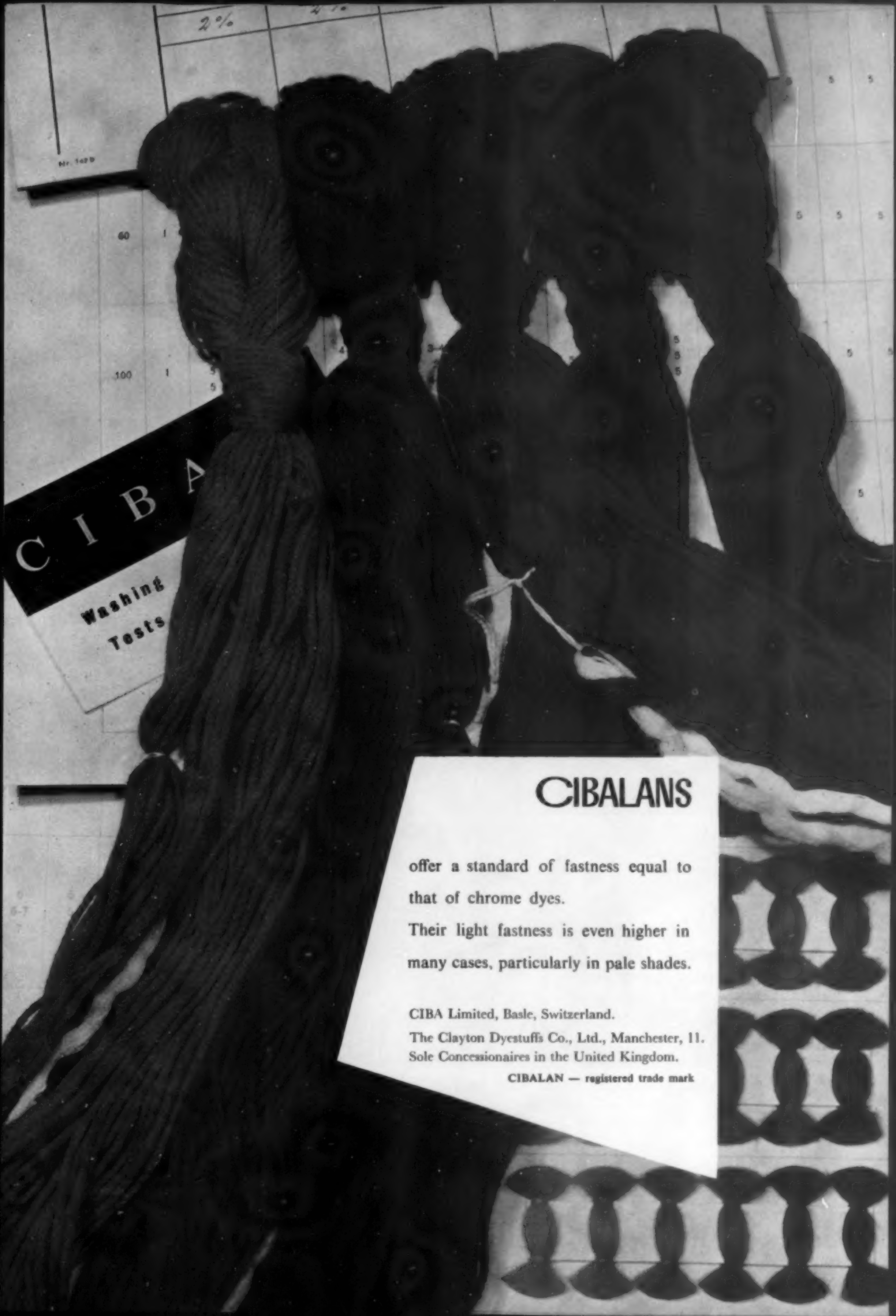
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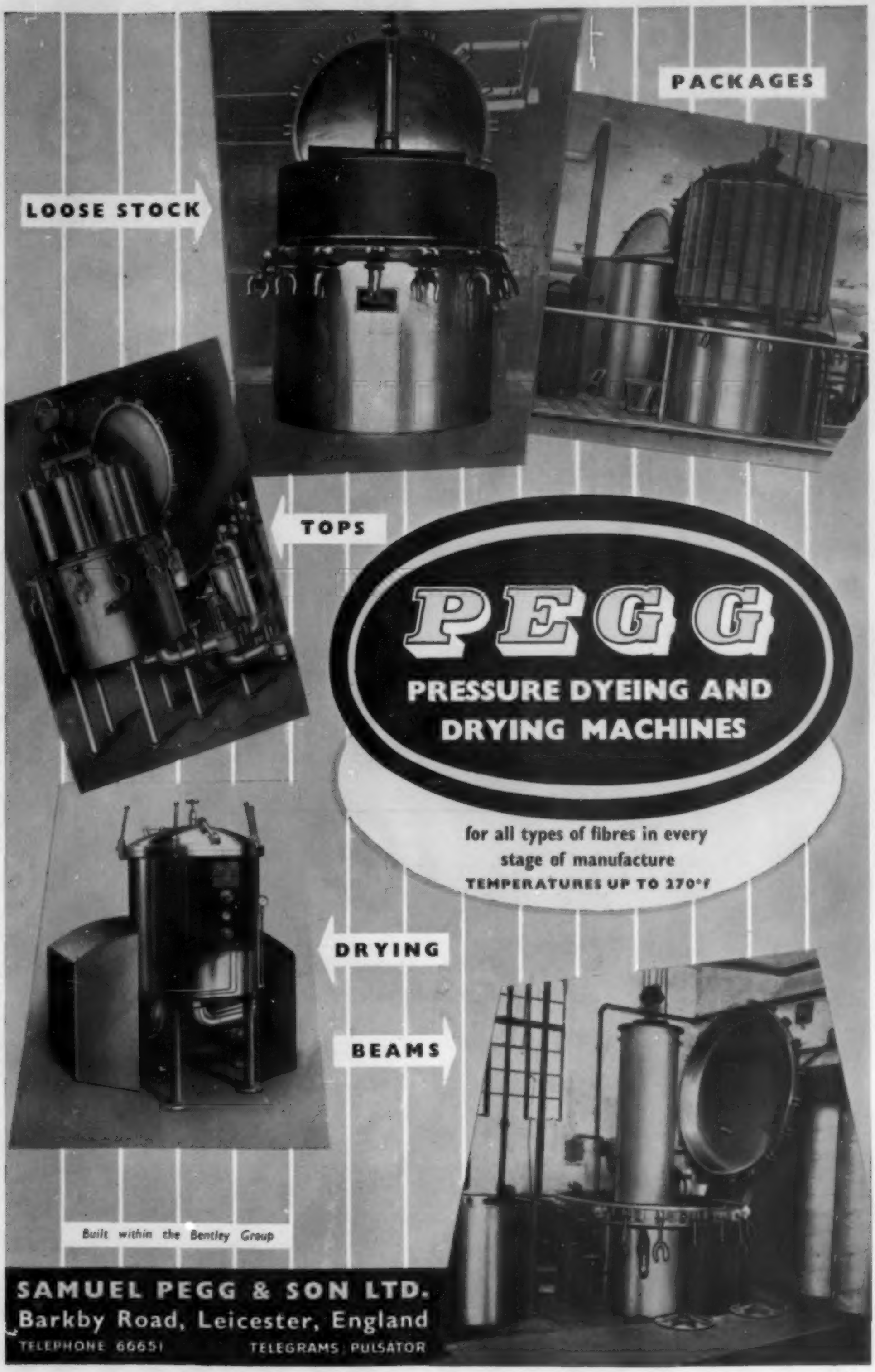
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He developed this commonsense approach to problems as a result of experience acquired whilst working with G. H. Hirst & Co. of Batley, the Geigy Colour Co. of Bradford, T. F. Firth & Sons of Heckmondwike, and in the dyehouse and research laboratory of Courtaulds Ltd. at Droylsden (with Dr. C. M. Whittaker and Mr. C. C. Wilcock). He finally assumed a leading rôle in the initiation and establishment of Courtaulds' Use–Development Organisation. In recent years he was responsible particularly for the setting up of serviceability-testing procedures, comparing the results of trials by users with laboratory testing in the evaluation of fibres, yarns, and fabrics. This work was of considerable value in establishing suitable performance standards as criteria for testing the serviceability of fabrics and garments.

Small wonder, therefore, that he was able to make welcome contributions at meetings of the Clothing Institute, the Textile Divisional Council of the British Standards Institution, and the Society's Manchester Section Committee. His untimely death has robbed the Society of his help on Council, to which he was only recently elected.

There is one common theme running through the innumerable letters of sympathy which have been received from many parts of the world, namely his kindliness of disposition and his inexhaustible courtesy.

One cannot do full justice in an obituary notice to the work and the qualities of the man, but suffice it to say that his relatives and all those who were privileged to know him well are very proud indeed of his achievements. H. A. Thomas

New Books and Publications

The Mathematics of Diffusion

By J. Crank. Pp. vii + 347. Oxford: Clarendon Press. 1956. Price, 50s. 0d.

Diffusion contributes to so many physico-chemical phenomena that diffusion kinetics holds a central place in various regions of chemistry. Standard texts which deal with the experimental aspects of diffusion in condensed phases have also paid considerable attention to the mathematics of diffusion, and in addition there is the classic book of Carslaw and Jaeger[1], which develops what may be described as the professional mathematician's approach to the subject, and is singularly rich in examples of solutions for diverse boundary conditions.

One may then ask what is the place of this new book by Dr. Crank on the "Mathematics of Diffusion"? In fact, however, the field is so rich that all previous texts omit much diffusion "case law" which is of fundamental significance to chemists. Moreover, during recent years many diffusion problems involving boundary conditions not hitherto treated have been solved. Dr. Crank's book, while in its earlier chapters based on the previous texts, does give a place to many of these new formulations. The mathematical side has, moreover, not been the only objective. The reader will find many graphical presentations of calculations of concentrations as functions of position and time or of amounts diffused as functions of time. These graphs give considerable physical insight into the great diversity of diffusion kinetics. A major development of recent years has centred around the generalised Fick law—

$$\frac{\partial c}{\partial t} = \frac{\partial}{\partial x}\left(D\frac{\partial c}{\partial x}\right)$$

where D may be a function of c, x, or even t. If $D = f(c)$ only, explicit solutions are not obtainable, but various treatments of the equation have been evolved which serve to determine D. These aspects, of great importance for diffusion in chemical systems, are well treated in several chapters: some methods of solution for variable diffusion coefficients, finite-difference methods, and some calculated results for variable diffusion coefficients. Other chapters are devoted to diffusion in systems with moving boundaries, to simultaneous diffusion and chemical reaction, and to simultaneous diffusion of heat and moisture. There is also a useful chapter on the definition and measurement of diffusion coefficients.

Anyone familiar with the earlier texts on diffusion will thus realise that this new book has much to offer that is complementary to these. The format is attractive and there appear to be few errors. The book should find a place on the bookshelves of many physicists and physical chemists.

R. M. Barrer

[1] Carslaw, H. S., and Jaeger, J. C., *Conduction of Heat in Solids* (Oxford: Clarendon Press. 1947).

High Polymers—Volume X
Polymer Processes
Chemical Technology of Plastics, Resins, Rubbers, Adhesives, and Fibres

Edited by C. E. Schildknecht. Pp. xvii + 914. New York and London: Interscience Publishers. 1956. Price, $19.50.

Although many aspects of fundamental theory have been discussed in previous volumes of this series and in other books, the chemical aspects of polymer technology, resulting from and developing concurrently with theory, have not always been specifically considered. This book is designed to remedy some of these omissions. The editor and the contributors, some European and all experts in the field they cover, attempt to relate technological polymer processes and reactions to basic theory.

About one-third of the book deals with general theory and processes of polymerisation, beginning with a clear account of free-radical polymerisation, which is followed by sections on polymerisation in

bulk, emulsion, and solution and on ionic polymerisation, both cationic and anionic. A further third is devoted to the chemistry and the technology of particular polymer types, including polyamides, polyesters, formaldehyde condensates, cellulose and its derivatives, epoxy resins, polysulphide polymers, and new adhesives. The remainder is concerned with processes generally applicable to polymers such as stabilisation, formation of pastes and latices, the compounding and processing of rubbers and resins, polymer reinforcement, and the spinning and drawing of fibres.

Considered as a volume of the well known *High Polymers* series, this book serves as a supplement, in certain cases, to other volumes. Thus, the sections on epoxy resins, polysulphide polymers, and new adhesives provide a great deal of new and up-to-date information. On the other hand, there is a good deal of material which has already been dealt with, in some cases at greater length, in previous volumes. This is so in the cases of cellulose and its derivatives, emulsion and some other aspects of polymerisation, and phenol–formaldehyde condensates. Judged by itself as a book on polymer processes, it is perhaps somewhat uneven. In some cases treatment is very full and many practical details are given, especially in the sections on polymerisation, paste and latex techniques, compounding and processing of rubbers and resins, and polymer reinforcement. On the other hand, the treatment of the technology of cellulose and its derivatives and the section on spinning and drawing of fibres could both be expanded.

The book does, however, generally succeed in relating processes to theory. The editor, who jointly or alone contributes four of the sections on polymerisation, has integrated the contributions so that there is no serious overlapping, and he is to be congratulated on providing a wealth of up-to-date information of value to polymer technologists of all types. Readers of this *Journal* will find much of interest in the sections on polyamides and polyesters, cellulose and its derivatives, and the spinning and drawing of fibres. The book is well documented with references to papers and patents up to the end of 1954. There are many clear diagrams and flow sheets, but some of the photographs illustrating processes or products are not always very clear and often add little to the text. Omission of these would not lower the value of the book but might lead to a reduction of the price. Printing, binding, and paper are of the high quality associated with this series.

W. R. Moore

Technique of Organic Chemistry—Volume IX
Chemical Applications of Spectroscopy

Edited by W. West. Pp. xxiv + 787. New York and London: Interscience Publishers. 1956. Price, $15.00.

It has been truly said that spectroscopy is now one of the most powerful physical tools available to the practical organic chemist. The book under review aims at collecting together in a single volume all the necessary theory and many of the chemical applications of spectroscopy so as to provide sufficient information for an understanding of the subject.

After an introductory survey of molecular spectra in Chapter I, microwave and radiofrequency spectra are discussed in Chapter II. Chapters III and IV are devoted to the theory and the applications of infrared and Raman spectra. Visible and ultraviolet spectra form the material for Chapter V, and the book concludes in Chapter VI with an account of fluorescence and phosphorescence. Each chapter is written by an acknowledged expert and is complete in itself.

From the point of view of the organic chemist, to whom the "Technique of Organic Chemistry" series is directed, the reviewer feels that this volume is too encyclopaedic in scope and is likely to confuse rather than clarify the applications of spectroscopy. The mathematical background required for an understanding of the chapters on spectral theory is far beyond that of the average chemist, and, as much of the book is built up from the theoretical point of view, this limits its usefulness as a means of interpreting spectroscopy for the non-specialist.

The experienced spectroscopist will, however, find this volume a most valuable source of information, its references to the literature being very full indeed, and a close study of its pages cannot help but produce a deeper knowledge of the processes involved in spectroscopy.

The book is excellently produced, but its price will place it beyond the reach of most individuals.

G. J. Weston

Abstracts from British and Foreign Journals and Patents

The titles of abstracts may be modified. Abbreviations of names of firms are listed in J.S.D.C., **68**, *23 (Jan. 1952), and also, together with symbols and the periodicals abstracted, in the annual index*

I—PLANT; MACHINERY; BUILDINGS

Automatic Temperature Regulation in Wool Dyeing
E. G. Tokar' and L. Z. Kudryavtseva

Tekstil. prom., **16**, 36–38 (April 1956)

An apparatus is described for the automatic regulation of the temperature of a dyebath in accordance with a pre-arranged schedule. A.E.S.

Centrifugal Dispersion Drying of Dyes and Intermediates
V. V. Kafarov and S. I. Shapiro

Khim. prom., 465–475 (1955): *Chem. Abs.*, **50**, 7516 (10 June 1956)

An account of work on the drying of suspensions by centrifugal atomisation and of the advantages to be gained by it. C.O.C.

Screen Printing of Hose
A. Franken
Textil Praxis, 11, 473–476 (May 1956)

A circular automatic screen printing machine made by Keller & Knappich, Augsburg, under *GP* 894,539 for printing hose is described. 1–3 colour prints can be produced on various sizes of hose. B.K.

PATENTS

Carbon Black—Process and Apparatus for Collection and Separation
Phillips Petroleum Co. *USP* 2,717,658

Treating Granules, Fibres, or Yarn with Liquid
Pluria AB. *BP* 751,202

Modification of *BP* 724,027 (J.S.D.C., 71, 253 (1955)). After the liquor has covered the material and before excess of liquor is removed, vigorous movement is imparted to the liquor, so that it is forced repeatedly through the material. C.O.C.

Drying Cordage
Puritan Cordage Mills *USP* 2,717,215

A continuous strand of cord or rope leaving a bath of liquid is passed so as to form two oppositely moving flights, each flight being spirally wound about the other with one or more convolutions, so as to bring each flight into intimate wiping and squeezing contact with the other and thus cause excess of liquor to be removed. This action may be repeated in successive oppositely moving flights. The flights may be formed by passing the cordage around two rollers, the intermediate portions of cordage between the two rollers being spirally wound around each other. C.O.C.

Drying Open-width Warps
Saco-Lowell Shops *BP* 751,914

The warp passes between two opposed hot-air distributors. The air is blown along the warp, there being air deflectors at the sides so as to deflect outwardly the flow of air near the sides of the yarn and thus displace outwardly the outer threads of the warp. This enables a drier to be built of reasonable size and yet with high capacity and drying speed. C.O.C.

Wet Treatment of Textiles
Tintoria Comense *BP* 750,859

The fabric travels through the liquor in a succession of almost parallel sections, moving in contrary directions, which may be arranged in any manner, e.g. vertically or horizontally. The distance between any two opposed sections of the fabric should be < 25 mm. This causes turbulence in the liquor between the sections and so greatly facilitates penetration of the liquid into the fabric. Use of this principle results in a small plant in which the effective path of the fabric is very great, the utmost possible use is made of the liquor, and no auxiliary apparatus is needed to impart turbulence to the liquor. C.O.C.

Wet Processing of Woven Fabrics
Örgryteverken AB. *BP* 749,042

The cloth, preferably in open width, passes through one or more baths each containing a vibration device. This device comprises sheet-metal plates corrugated across the oscillation direction of a vibrator, one end of each plate being fastened to the vibrator, thereby imparting to the plates longitudinal oscillations at right angles to the corrugations. C.O.C.

Centrifuges
Emailleerfabriek De Ijsel NV. *BP* 751,554

An electric motor, vertically and resiliently mounted, has the centrifuge cage on the upper end of its shaft, the whole being contained in a casing. The motor is solely suspended by three or more strips of rubber which extend radially between an upper end member of the motor housing and the casing. This prevents vibration in the motor from being transmitted to the casing. C.O.C.

Suction Extractors
William Whiteley & Sons *BP* 750,933

The release valve for the vacuum box is operated by a solenoid controlled by a dynamic relay driven by part of the draw-through roller drive. This ensures that any cloth which overruns the box after the clutch is disengaged has the moisture extracted from it. C.O.C.

Pulsator for a Washing Machine
Birkhoff's Apparatenfabriek *BP* 751,469

Combined Tenter Clamp and Pin Chain
H. Krantz Söhne *BP* 751,930

Desizing of Glass Fabrics
Alexander H. Kerr & Co. *BP* 750,409

Apparatus in which the size is rapidly burnt off the fabric. C.O.C.

Register-control Systems for Moving Webs
J. F. Crosfield *BP* 750,256

In a machine for performing one or more operations on a moving web, e.g. printing or embossing, pairs of indicating marks are made on the web in a fixed relationship to each of the operations performed. Each pair of marks is such that the distance between them measured in the direction of motion of the web varies with the distance from the edge of the web. The time interval between the two marks passing a given point, e.g. measured by a photoelectric method, controls the operations. C.O.C.

Cloth-guiding Device
G. Durrant & Sons *BP* 749,863

A pair of co-operating rollers are placed at an angle to the direction of travel of the cloth. One of the rollers is pivoted about an axis spaced from its own to separate it from the other roller. Normally, the rollers are urged together so that they form a nip for and are driven by one edge of the cloth. There is a rotatable friction surface and means, operating only when the width of the cloth edge between the rollers exceeds a fixed amount, to bring this surface into a driven-relationship with one of the rollers. This surface is so shaped and is in such co-operative relationship with the pivoted roller that the latter is moved and the cloth edge released. Normally two such pairs of rollers are used, one at each side of the cloth and set at a slight angle to the weft. C.O.C.

Weft Straightening
British Rayon Research Assocn. *BP* 749,250

Two beams of light are directed on the same area of the cloth and are reflected from it so that the intensity of light in a given direction which falls on a sensitive element is constant when the weft is straight but fluctuates when it departs from being straight. These fluctuations actuate mechanism which straightens the weft. C.O.C.

Raising Machine
Tomlinsons (Rochdale) *BP* 749,896

In a wire raising machine, the drive for the pile and counterpile rollers comes from a single source, and a differential gear is placed between the two sets of rollers so as to balance automatically the difference in their rotation at speeds in accordance with the difference in reaction between each set of rollers and the cloth. C.O.C.

Screen Printing Machine
L. G. Dubuit *BP* 751,922

Device for obtaining exact registration when printing a multicolour design. C.O.C.

Continuous Batching Machines for Forming Rolls of Cloth from Long Lengths
Sir James Farmer Norton & Co. *BP* 750,112

Drum Drying Machine for Garments
Lovell Manufacturing Co. *BP* 752,189

A three-pulley support which eliminates the objectionable rumbling noise hitherto met in running this type of machine. C.O.C.

Drying and Smoothing Raincoats and other Garments
Hoffman Maschinen *BP* 752,047

Spray Coating of Articles
Harper J. Ransburg Co. *BP* 749,008

A method in electrostatic coating of controlling the pattern of deposition of a spray of coating material. C.O.C.

Recovery of Surplus Glaze or Colour Media when Spraying
British Ceramic Research Assocn. *BP* 752,096

The surplus sprayed material collects on a curved or

inclined surface in the lower part of the hood or spraying booth, and is allowed to drain off into a receiver. Such material as is not so collected is drawn off by a suction duct, dried while passing along the duct, and delivered to a filter or separator, where it is collected and the clean air is drawn off. C.O.C.

II—WATER AND EFFLUENTS

Problems of Effluents
M. Kehren and H. Denks
Z. ges. Textilind., **58**, 305–312 (20 April 1956)

This paper deals with the increasing problems in the disposal and purification of effluents due to the expansion of industry. The methods of purification used are described and include filtration and biological and chemical treatment. Clarification of effluents from various sources, including paper and cellulose industries, tanneries, and textile and dye industries, is discussed. B.K.

PATENTS

Flocculating Very Fine Suspensions
A. Knepper *BP* 749,662

The flocculating power of humic acid and alkali-metal humates is much greater if the waste water being treated is kept at pH 4·5–7·0 throughout the treatment. C.O.C.

Operation of Water-softening Plants
Sulzer Frères *BP* 751,479

III—CHEMICALS; AUXILIARY PRODUCTS; FINISHING MATERIALS

Six-co-ordinate Copper (II)
S. Kirschner
J. Amer. Chem. Soc., **78**, 2372–2375 (5 June 1956)

In its ethylenediaminetetra-acetato and diaspartato complexes copper (II) is six-covalent. All the N atoms and carboxyl groups in these complexes are co-ordinated to the metal ion. C.O.C.

Fats, Oils, and Detergents—Annual Review of the Literature
M. M. Piskur
J. Amer. Oil Chem. Soc., **33**, 203–218 (May) and 240–263 (June 1956)

PATENTS

Synergistic Anti-foam Compositions
Arocan Chemicals *BP* 750,816

Addition of a triallyl phosphate, preferably together with an alcohol, greatly improves the anti-foaming properties of silicone defoamers, e.g. those described in *BP* 631,049 and 689,306. C.O.C.

Silicone-containing Sizes for Glass Fibres
Owens-Corning Fiberglas Corpn. *BP* 750,135

A size for glass fibres, which gives improved balance between binding action and lubricity, is preferentially attracted to the glass fibre surfaces and minimises the effect of moisture, and renders the fibres highly receptive to resinous materials and adhesives, comprises a film-forming polymeric resin, e.g. plasticised polyvinyl acetate, and a water-soluble polysiloxanoxide of formula $Z{\cdot}[SiRZ{\cdot}O]_n{\cdot}M$ (M = Na, K, Li, or NH_4; at least one R is an unsaturated radical of < 6 C in a straight chain and the remaining R = H, Ar, Alk, and heterocyclic radicals; Z = same or different R, O·M, and $[O{\cdot}SiRY]_n{\cdot}Y$; Y = R or O·M; $n > 1$). J.W.B.

Non-thermosetting Water-soluble Melamine Resins as Substitutes for Gelatin, Carboxymethylcellulose, and other Hydrophilic Colloids
British Industrial Plastics *BP* 751,501

Products useful as thickening and emulsifying agents are obtained by modifying water-soluble melamine-formaldehyde resins with an alkali-metal sulphite. C.O.C.

Wetting Agents
S *BP* 751,244

The products obtained by treating an alkali-metal sulphite or bisulphite with halogenohydrins of monoalkyl ethers of glycerol (Alk of 5–7 C), or with the corresponding epoxides, are excellent wetting agents. If desired, the reaction components or the reaction product can be mixed with ether alcohols. C.O.C.

Preventing Soap from forming Scum in Hard Water
Unilever *BP* 750,495

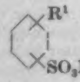
Addition to soap of 1–10% by wt. of a surface-active, non-ionic non-detergent, e.g. *p*-*n*-butylphenol, and $\nless 15\%$ of a non-cationic non-soapy detergent, e.g. a polyethylene oxide derivative of octylphenol, prevents scum formation when the soap is used in hard water. C.O.C.

Soapless Detergent
Unilever *BP* 751,273

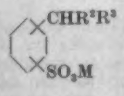
A mixture of an aliphatic *N*-substituted aminocarboxylate, an aliphatic *N*-acylaminoalkenesulphonate, and an alkyl sulphate shows the same detergent efficiency in both hard and soft water. C.O.C.

Detergent Composition
Esso Research & Engineering Co. *BP* 749,737

A mixture of a large amount of a water-soluble alkali-metal salt of a branched-chain alkylarylsulphonic acid, preferably of formula—



(R^1 = branched-chain Alk of 9–18 C; M = alkali metal) and a smaller amount of a water-soluble alkali-metal salt of a straight-chain *sec.*-alkylarylsulphonic acid, preferably of formula—



(R^2 = straight-chain Alk of 2–5 C; R^3 = straight-chain Alk of 8–14 C; $R^2 + R^3$ contain 10–16 C) has better detergent power at low concn. ($\ngtr 0{\cdot}25$ g./100 ml.) than the additive effects of each component alone. C.O.C.

Textile-fibre and Machine Lubricants
Textile Oils *BP* 750,122

Lubricants for both fibres and machines consist substantially of a refined mineral hydrocarbon oil having a Cleveland open-cup flash point $> 270°$F., blended with 3–50% by wt. (calculated on the mineral oil) of one or more detergent emulsifiers of the following types, which contain 1 free OH group having alcoholic characteristics at the end of a polyethylene oxide chain—(*a*) a monoether, having a polyethylene oxide chain of 3–12 mol. of ethylene oxide, of an alkylphenol of 8–20 C in 1 or at most 2 alkyl radicals, e.g. dodecylphenyl poly(8)glycol monoether; (*b*) a monoether, with a similar polyethylene oxide chain, of a long-chain monohydric fatty alcohol of > 10 C and having its OH group on an α, β, or γ C, or of a sterol or alcoholic material from the hydrolysis of wool wax, e.g. cetyl poly(12)glycol monoether; (*c*) a monoester of a polyethylene oxide ether glycol, with similar ethylene oxide chain, and a long-chain monobasic or monobasic-monohydroxy fatty acid of $\nless 8$ C, or a wool-wax monobasic acid, or various other monobasic acids with long alkyl chains. J.W.B.

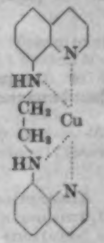
Non-ionic Antistatic Agents
American Cyanamid Co. *USP* 2,718,478

The condensates of 8–175 mol. of a lower alkylene oxide with 1 mol. of dimerised unsaturated fatty acid hydroxyalkylamide, e.g. those described in *USP* 2,470,801, are used as antistatic agents for hydrophobic, thermoplastic man-made fibres, wool, and silk. Preferably 0·25–2·0% by weight of a condensate of ethylene oxide and a monoethanolamide is deposited on the fibres. C.O.C.

Diquinolylpolyalkylenepolyamines—Chelating Agents
Dow Chemical Co. *BP* 749,117

Compounds of formula—

(Alkylene = alkylene or *cyclo*alkylene interposing 2 or 3 carbon atoms between the N atoms in the chain; A = H, Alk of < 8 C, or an acetic or higher homologous acid residue; *n* = whole number) and their salts are extremely powerful chelating agents, particularly for the transition metals, one molecule of the agent forming a complex with one metal ion. Thus Cu is very strongly complexed by bis-8-quinolylethylenediamine to form—



Such chelates are at least sparingly soluble in water and are usually soluble in organic solvents. C.O.C.

Glycol and Polyglycol Esters—Textile Assistants
FH *BP* 750,791

A condensate of a fatty acid of 12–27 C with an aminocarboxylic acid is treated in presence of a condensation catalyst with 1–4 mol. of ethylene oxide or 1 mol. of the appropriate polyglycol or ethylene glycol, or a salt of the condensate is heated with 1 mol. of ethylene chlorohydrin. The products are viscous or waxy and can be used e.g. as softening agents. C.O.C.

Waterproofing
Société des Usines Chimiques Rhône-Poulenc
BP 750,805

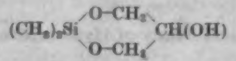
Compositions containing an organopolysiloxane resin and a titanic ester, especially butyl titanate, are excellent waterproofing agents for cement, bricks, and plaster. C.O.C.

Water-soluble Neutral Organosilicon Compounds—Hydrophobic Agents
Midland Silicones *BP* 749,958

Compounds of formula—

$$[Si(CH_3)_2 \cdot O \cdot CH_2 \cdot CH(OH) \cdot CH_2 \cdot O]_x$$

(x = whole number), e.g.—



are obtained by treating glycerol with a dimethyldialkoxysilane or dimethylsilazan. They are used as mould-release agents for organic plastics and as hydrophobing agents. C.O.C.

Solvents for Acrylonitrile–*N*-Substituted Acrylamide Copolymers
Celanese Corpn. of America *USP* 2,717,883

Nitromethane, *cyclo*pentanone, *cyclo*hexane, and acetone readily dissolve acrylonitrile–vinamide copolymers. C.O.C.

Antistatic Agents
American Cyanamid Co. *USP* 2,717,842

A mixture of a soluble inorganic salt which is normally deposited as relatively large crystals when the solvent is evaporated, e.g. $HgCl_2$, $ZnCl_2$, etc., and a crystal-growth-inhibiting agent, e.g. a compound of formula—

$$(R^1 \cdot CO \cdot O \cdot CH_2 \cdot CH(OH) \cdot CH_2 \cdot O \cdot CO \cdot CH(SO_3M) \cdot CH_2 \cdot CO \cdot O)_2R^2$$

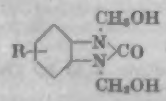
(R^1 = aliphatic radical of > 6 C; R^2 = bivalent organic radical of > 1 C) made by the process described in *USP* 2,698,856, acts both as softening and lubricating agent for textile fibres in addition to its antistatic properties. C.O.C.

Aqueous Dispersions for Use in Coating Compositions and Paints
ICI *BP* 749,719

A pigmented dispersion has one continuous aqueous phase, at least one dispersed pigment, and a dispersed copolymer of 55–75% methyl methacrylate and 45–25% 1:3-butadiene. Such a dispersion yields strong tenacious films and is used as a base for coating compositions, particularly water-paints for indoor use, and paper- or leather-coating compositions. C.O.C.

Agents for Hardening Gelatin
Kodak *BP* 749,326

Compounds of formula—



(R = H, Alk, and/or Hal), e.g. 1:3-bishydroxymethylbenziminazol-2-one, render gelatin resistant to hot water. C.O.C.

Tanning Agents
FH *BP* 750,143

Readily soluble tanning agents of excellent properties are obtained by condensing diphenylsulphonic acid, 4·4′-dihydroxydiphenyl sulphone or a formaldehyde condensate thereof obtained in alkaline medium, and at least one alkylbenzenesulphonic acid containing > 1 replaceable H atom in the nucleus with formaldehyde in acid medium. C.O.C.

Emulsified Ionically Cross-linked Resins as Surface Coatings, as Impregnating Agents, and for Producing Foils (V p. 454)
Emulsifiers for Use in Printing Pastes (IX p. 460)

IV—RAW MATERIALS; INTERMEDIATES; COLOURING MATTERS

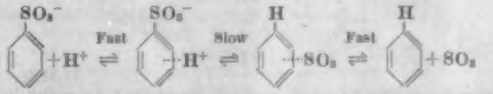
Centenary of the Discovery of One of the First Synthetic Dyes
B. M. Bogoslovskii
Tekstil. prom., 16, 39 (May 1956)

An appreciation of the work of W. H. Perkin. A.E.S.

Arthur von Weinberg
H. Ritter and W. Zerweck
Chem. Ber., 89, XIX–XLI (June 1956)

Mechanism of Aromatic Sulphonation and Desulphonation in Aqueous Sulphuric Acid
V. Gold and D. P. N. Satchell
J.C.S., 1635–1641 (June 1956)

Sulphonation of benzene by aq. H_2SO_4 (77·5–87·6 wt. %) is studied kinetically as a homogeneous reaction by application of an isotope dilution technique. The data found, together with earlier results on sulphonation and disulphonation in aq. acid, are shown to be compatible with the scheme—



H.H.H.

Diaryl-2:2′-disulphonic Acids and Related Compounds. I—The Diphenyl and the Ditolyl Series
W. L. F. Armarego and E. E. Turner
J.C.S., 1665–1670 (June 1956)

Kinetics and Mechanism of the Reaction of Nitrosobenzene with Bisulphite
G. Kresse and H. Manthey
Chem. Ber., 89, 1412–1422 (June 1956)

Oxygen Radicals—Nitration of 2:4:6-Tri-*tert*.-butylphenol
K. Ley and E. Müller
Chem. Ber., 89, 1402–1412 (June 1956)

Electrophilic Substitution. II—Nitration of Naphthalene and Perylene
M. J. S. Dewar and T. Mole

J.C.S., 1441–1443 (June 1956)

Naphthalene has been nitrated with nitric acid (sp.gr. 1·5) in acetic anhydride at 0°, 20°, and 45°c., an excess of hydrocarbon being used. Excess of naphthalene and the small amount of quinones formed were removed by chromatography on alumina, and the ratio of α- to β-nitronaphthalene was determined by comparing the ultraviolet spectra of the mixtures with the spectra of the pure isomers. For the nitrations at 0°, 20°, and 45°c., α/β = 10, 10, and 8 respectively. Mononitration of perylene yields mainly one isomer (94%), believed to be 3-nitroperylene; it was reduced to the amine with hydrazine hydrate in ethanol in the presence of palladised charcoal. H.H.H.

Preparation of Adipic Acid by Oxidation of *cyclo*-Hexanol with Nitric Acid
E. N. Zil'berman, S. N. Suvorova, and Z. S. Smolyan

J. Appl. Chem. U.S.S.R., 29, 621–627 (April 1956)

The optimum concn. of HNO_3 for the oxidation of *cyclo*hexanol to adipic acid is 40–50%; the yield is reduced if reaction is prolonged. Reduction of HNO_3 concn. favours formation of glutaric and succinic acids at the expense of adipic, and at 5–10% HNO_3 glutaric acid is the main product. The yield of adipic acid is increased, and that of succinic acid is reduced, by addition of V, Cu, and Bi cpd.; moreover, V cpd. reduce oxalic acid formation, and Cu cpd. reduce glutaric acid formation. The best yield of adipic acid is obtained in presence of a mixed V–Cu catalyst. A.E.S.

Dihydroxynaphthalenes
Ng. Ph. Buu-Hoï and D. Lavit

J.C.S., 1743–1748 (June 1956)

Syntheses are reported of several mono- and di-substituted deriv. of dihydroxy- and dimethoxy-naphthalenes (methyl homologues, alkyl and benzyl deriv., aldehydes, ketones), and the positions of the substituents are discussed. The conversion of dihydroxynaphthalenes into benzocoumarins and other heterocyclic systems is also investigated. An interesting difference exists between 2:6- and 2:7-dihydroxynaphthalene, in that the former gives no condensation product with ethyl acetoacetate, whereas the latter affords 2′-hydroxy-4-methyl-5:6-benzocoumarin. H.H.H.

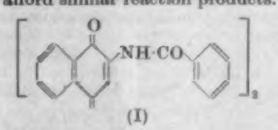
Some *N*- and *O*-Derivatives of 5-Hydroxy-1-naphthylamine
P. H. Payot

J. Org. Chem., 21, 582–583 (May 1956)

Oxidation of 2-Naphthylamine with Benzoyl Peroxide
S. F. D. Orr, P. Sims, and D. Manson

J.C.S., 1337–1344 (June 1956)

The principal product of the oxidation is di-(3-benzamido-1:4-dihydro-4-oxonaphthylidene) (I) accompanied by 2:2′-azonaphthalene and 1:2-5:6-dibenzophenazine. The reactions of benzoyl peroxide with 2-acetamido- and 2-benzamido-naphthalene are less vigorous but afford similar reaction products.



(I)

H.H.H.

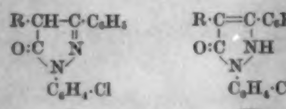
Synthesis of 1-Methyl- and 1:6-Dimethyl-3-methoxy-4-*iso*propylnaphthalene
P. B. Talukdar

J. Org. Chem., 21, 506–508 (May 1956)

Synthesis and Absorption Spectra of 4-Alkyl-1-chlorophenyl-3-phenyl-5-pyrazolones and [4-^{14}C]-Pyrazolones
P. E. Gagnon, J. L. Boivin, and Y. Laflamme

Canadian J. Chem., 34, 530–540 (April 1956)

The ultraviolet and infrared spectra of pyrazolones obtained by reaction of $C_6H_5{\cdot}CO{\cdot}CHR{\cdot}CO{\cdot}OC_2H_5$ (R = H, C_nH_{2n+1} (n = 1–9), and $C_6H_5{\cdot}CH_2$) with *o*-, *m*-, and *p*-chlorophenylhydrazine have been measured. It is concluded that the pyrazolones have structure I in the solid state and structure II in alcoholic soln.—



(I) (II)

A.J.

Vapour Pressures and Heats of Sublimation of *p*-Nitroaniline, *NN*-Dimethyl-*p*-nitroaniline, *p*-Aminoazobenzene, and *NN*-Dimethyl-*p*-aminoazobenzene
T. G. Majury

Chem. and Ind., 349–350 (5 May 1956)

Data extracted from the paper in J.S.D.C., 72, 41–49 (Feb. 1956).

Aryl-2-halogenoalkylamines
W. C. J. Ross and C. P. Warwick

XVI—Preparation of Derivatives of 4-[Di-(2-chloroalkyl)amino]azobenzenes

J.C.S., 1364–1369 (June 1956)

The preparation of 59 mono-, di-, and tri-substituted deriv. of 4-[di-(2-chloroalkyl)amino]azobenzenes is described.

XVII—Ultraviolet Absorption Spectra of some 4-Di-(2-chloroethyl)aminoazobenzenes in Neutral and Acidic Ethanol Solutions

Ibid., 1719–1724

The above data were obtained because of a possible relation between the effects of substituents on the position of the absorption maxima and on the biological activity, and also because methods for assessing the reducibility of the azo linkage in the cpd. demanded a knowledge of their absorption characteristics in neutral and acidic soln. [see following abstract]. The absorption spectra of certain 2′-carboxy deriv. which present unusual features are examined in chloroform and in alkaline ethanol soln.; neutral soln. of these acids are considered to contain appreciable proportions of a hydrogen-bonded hybrid.

XVIII—Rates of Reduction of Substituted 4-Di-(2-chloroethyl)aminoazobenzenes by Stannous Chloride, Hydrazine, and the Xanthine Oxidase–Xanthine System

Ibid., 1724–1732

Measurements of rates of reduction for 39 of the title azo cpd. by acid $SnCl_2$ and by hydrazine in neutral ethanolic soln. are recorded, and the effects of substituents on the reducibility of the azo linkage are discussed. For reduction in acid soln., the effect of 3′ and 4′ substituents can be expressed by the Hammett equation, ρ having the value 1·59. Rates of reduction of some water-sol. azo deriv. by the xanthine oxidase–xanthine system in pyrophosphate buffer under anaerobic conditions indicate that reduction of the azo linkage potentiates inhibition of tumour growth by the azo cpd. H.H.H.

Magnetochemical Study of Hydroxyazobenzenes
Y. Matsunaga

Bull. Chem. Soc. Japan, 29, 308–311 (April 1956)

Magnetic susceptibilities in solution of azobenzene and some of its derivatives have been measured, and the contribution made to the susceptibility by the azo group has been determined. The susceptibilities of 20 hydroxyazobenzenes, chiefly derivatives of phenol and *p*-cresol, have been measured and compared with values obtained from the sum of additive and constitutive contributions for the azophenol and the quinonehydrazone forms. It is concluded that the hydroxyazobenzenes exist in the azophenol form. W.R.M.

Formation of Symmetrical Azo Compounds from Primary Aromatic Amines with Lead Tetra-acetate
E. Baer and A. L. Tosoni

J. Amer. Chem. Soc., 78, 2857–2858 (20 June 1956)

Oxidation of substituted primary aromatic amines with lead tetra-acetate yields complex mixtures of coloured oxidation products that contain fair amounts of symmetrical azo compounds. Thus into *p*-bromoaniline (5 g.) in anhydrous benzene (1·2 litres) was stirred in 1 hr. fine powdered lead tetra-acetate (25·8 g.). The lead diacetate was filtered off, and the filtrate washed with water (300 ml.). After separation, the benzene layer was concentrated to 15 ml. This on cooling in ice yielded a

solid (3·1 g.), which on sublimation *in vacuo* at 200–250°c. yielded 1·8 g. of 4:4′-dibromoazobenzene (36% of theoretical). C.O.C.

Azo Dyes having a Vinyl Group in the *ortho* Position
J. Aboulifa

Compt. rend. Acad. Sci. Paris, **241**, 1469–1471 (1955): *Chem. Abs.*, **50**, 8207 (10 June 1956)

The absorption spectra of the red dyes *o*-vinylphenylazo-2-naphthol (obtained by diazotising *o*-vinylaniline in 10% HCl at 5°c. and coupling with 2-naphthol), *o*-vinylphenylazoresorcinol, and *o*-vinylphenylazo-2-naphthylamine when compared with those of the corresponding aniline derivatives show little effect of the *o*-vinyl group. C.O.C.

Analytical Aspects of Some Azo Dyes from Chromotropic Acid. I— SNADNS Dyes in Detection and Volumetric Determination of Thorium and Preparation of Such Dyes
S. K. Datta

Z. anal. Chem., **149**, 270–277 (1956): *Chem. Abs.*, **50**, 7651 (10 June 1956)

Preparation of di-SNADNS (2:7-bis(4-sulpho-1-naphthylazo)-1:8-dihydroxy-3:6-naphthalenedisulphonic acid), SNADNS (2-(4-sulpho-1-naphthylazo)-1:8-dihydroxy-3:6-naphthalenedisulphonic acid), and nitroso-SNADNS (7-(4-sulpho-1-naphthylazo)-1:8-dihydroxy-2-nitroso-3:6-naphthalenedisulphonic acid) is described. Their use as indicators is also described. C.O.C.

Azo Dyes. VI— Azo Dyes with a Thiocyanato Group
K. Murata, K. Harada, and H. Kuwata

Bull. Fac. Eng., Hiroshima Univ., **4**, 281–286 (1955): *Chem. Abs.*, **50**, 6795 (10 May 1956)

The colours given on wool by some mono- and dis-azo dyes having a thiocyanato group are described. Thus the monoazo compound *p*-thiocyanatoaniline (I)→Schäffer's acid gives red–orange; the disazo compound 2I⇉H acid gives blue; sulphanilic acid→I gives yellow; sulphanilic acid→4-thiocyanato-1-naphthol gives grey; and benzidine-2:2′-disulphonic acid⇉2 *p*-thiocyanatophenol gives yellow. E.S.

Preparation, Properties, and Application of Formazan Dyes
H. Wahl and M. T. Le Bris

Compt. rend. 27 Congr. intern. Chim. ind. Bruxelles, **3** (1954): *Industrie chim. belge*, **20** (Special No.), 662–665 (1955): *Chem. Abs.*, **50**, 8207 (10 June 1956)

Formazan dyes are obtained by coupling diazotised aniline, toluidine, chloroaniline, dichloroaniline, naphthylamine, nitroaniline, chloronitroaniline, 4-chloro-2-aminoanisole, *p*-methoxy-*p*′-aminodiphenylamine, *o*-aminoazotoluene, dianisidine, 3-nitro-4-aminoanisole, 4-nitro-2-aminoanisole, and 5-diethylsulphamoyl-2-methoxyaniline with active methyl or methylene compounds, e.g. 2-methylene-1-methylbenzothiazoline, 2-methylbenzoselenazole, 2-methylbenziminazole, 2-methylbenzoxazole, quinaldine, lepidine, and indolenine. Single or double coupling may occur. These dyes yield easily crystallised salts with strong acids and form insoluble metal complexes with Cu, Co, and Ni salts and soluble complexes with Fe salts. Their hues vary from orange to blue and they can be formed *in situ* in the fibre. They are fast to light and washing, especially in the form of their insoluble metal complexes. C.O.C.

Fluorine-containing Aniline Derivatives as Azoic Diazo Components
K. Inukai and K. Hosokawa

J. Chem. Soc. Japan, Ind. Chem. Sectn., **58**, 592–594 (1955): *Chem. Abs.*, **50**, 7463 (25 May 1956)

Orange to red dyeings were obtained by coupling Naphtol AS with *o*-fluoroaniline, *m*- and *p*-fluoroaniline, 3-trifluoromethyl-6(and 2 and 4)-nitroaniline, *o*- and *p*-trifluoromethylaniline, and *m*-trifluoromethylaniline. The first and the last of these had the best fastness properties. The absorption spectrum of each dye is given, and discussed with reference to the position of the radicals attached to the benzene ring. C.O.C.

Effect of Steric Factors on the Properties of Dyes containing the Diphenyl Nucleus. III— Disazo Dyes derived from Diphenyl, Phenanthrene, Phenazone, and Phenanthridone.
B. M. Krasovitskii, D. G. Pereyaslova, O. D. Kovalenko, and L. I. Shcherbakova

Ukrain. khim. zhur., **21**, 614–618 (1955): *Chem. Abs.*, **50**, 9021 (25 June 1956)

Dyes from 2:7-diaminophenanthrene and 2:7-diaminophenazone differ little from each other and from the 2:7-diaminophenanthrenequinone, but are more highly coloured than the 2:7-diaminofluorene and the 2:7-diaminocarbazole dyes. They are nearly as substantive as the 2:7-diaminofluorene dyes and more substantive than the 2:7-diaminocarbazole dyes. The 2:7-phenanthridone dyes differ little in depth of colour and substantivity from the corresponding benzidine dyes, but are much more deeply coloured and more substantive than the 3:3′-diaminobenzanilide dyes. The 2:4:4′-triaminodiphenyl dyes are much less substantive and more highly coloured than the benzidine dyes because of steric hindrance, and come between the benzidine and diphenylene dyes. C.O.C.

Spectroscopic Properties of Organic Photoconductors. I— Absorption Spectra of Cationic Dye Films
J. W. Weigl

J. Chem. Phys., **24**, 364–370 (1956): *Chem. Abs.*, **50**, 7576 (10 June 1956)

Absorption spectra are given of solid films of Crystal Violet, Malachite Green, Trypaflavine, Methylene Blue, Rhodamine B, and Pinacyanol. The transitions in the solid state correspond to those of the isolated cations in solution. The results are interpreted in terms of light absorption by a single molecule followed by exciton motion in the lowest excited state. C.O.C.

Silicon Analogue of Crystal Violet
U. Wannagat and F. Brandmain

Z. anorg. allgem. Chem., **280**, 223–240 (1955): *Chem. Abs.*, **50**, 7753 (10 June 1956)

Preparation of the silicon analogue of Crystal Violet (R_3SiCl) is described, and its ultraviolet and infrared spectra are compared with those of Crystal Violet (R_3CCl). The spectra of the two dyes are markedly different, as are also their chemical and physical properties, primarily because of the ionic nature of Crystal Violet. The carbonium ion formulation for Crystal Violet is considered doubtful. C.O.C.

A Malachite Green from *p*-Benzylbenzaldehyde
H. Gault and J. Gilbert

Compt rend. 27 Congr. intern. Chim. ind. (Bruxelles), **3** (1954): *Chem. Abs.*, **50**, 8552 (25 June 1956)

p-Benzylbenzaldehyde, dimethylaniline, and HCl when refluxed for 12 hr. give an 81% yield of the leuco base, which, when oxidised with PbO_2, gives a 96% yield of the dye. The oxalate of the dye forms brilliant green crystals. C.O.C.

Derivatives of Fluorene. II— 9-Arylimino Compounds
M. E. Taylor and T. L. Fletcher

J. Org. Chem., **21**, 523–527 (May 1956)

Mono-reduction of 2:5-Dinitrofluorene
J. H. Weisburger and E. K. Weisburger

J. Org. Chem., **21**, 514–515 (May 1956)

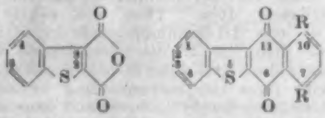
Using hydrogen sulphide and ammonia, 2-amino-5-nitro- (40%), 5-amino-2-nitro- (5·5%), and 2:5-diaminofluorene (1·5%) were isolated, but with stannous chloride the yields were 18, 22, and 2% respectively. H.E.N.

New Intermediates and Dyes. IV— Condensation of Thionaphthen-2:3-dicarboxylic Anhydride with Hydrocarbons and Phenols
A. T. Peters and D. Walker

J.C.S., 1429–1436 (June 1956)

The title intermediate (I) and its 6-chloro-4-methyl deriv. condense with acenaphthene to give 3-(3-acenaphthenylcarbonyl)thionaphthen-2-carboxylic acids, which could not be cyclised. I reacted with phenol to yield a phenolphthalein analogue, or with quinol to give 6:11-dihydro-7:10-dihydroxy-6:11-dioxobenzo[*b*]thiophanthren (II). Resorcinol and I afforded a fluorescein analogue and

also 3-(2:4-dihydroxybenzoyl)thionaphthen-2-carboxylic acid. II is readily converted into the 7:10-bismethylamino and 7:10-bis-*n*-butylamino compounds by heating it with sodium dithionite and an alcoholic soln. of the appropriate amine in a sealed tube at 140–145°c. and 135–140°c. respectively. The new dyes (III) are purified by chromatography, and dye cellulose acetate and nylon a pale greenish blue, weaker than the royal blues produced by 1:4-bismethylamino- and 1:4-bis-*n*-butylamino-anthraquinone; loss of tinctorial power thus occurs on introduction of the thionaphthen ring.



(I) (II: R = OH)
(III: R = NH·CH_3 or NH·C_4H_9)

H.H.H.

Crystallography of Acridine. II—The Structure of Acridine III
D. C. Phillips
Acta Cryst., **9**, 237–250 (1956)

Syntheses in the Iminazolone Series
J. Brunken and G. Bach
Chem. Ber., **89**, 1363–1373 (June 1956)

N- or *N′*-Substituted glycine amides (*a*-aminoacetamides) are condensed with orthocarboxylic esters to 1:2-disubstituted iminazol-4- or -5-ones. The use of these cpd. in the synthesis of sensitising dyes is explored.
H.E.N.

Heterocyclyl-rhodanines and -2-thiohydantoins
E. B. Knott
J.C.S., 1644–1649 (June 1956)

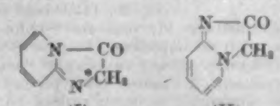
The preparations from ethyl *N*-2-pyridylaminoacetate of a series of 3-substituted 1-2′-pyridyl-2-thiohydantoins are described, together with the condensation of *N*-pyridyl-, *N*-quinolyl-, and *N*-thiazolyl-dithiocarbonic esters with *N*-substituted glycines, glycine esters, or glycine nitriles to give 3-pyridyl-, 3-quinolyl-, and 3-thiazolyl-2-thiohydantoins, or their cyclisation to the 3-substituted rhodanines. H.H.H.

Some Chain-substituted Methincyanines and Styryl Dyes
F. M. Hamer
J.C.S., 1480–1498 (June 1956)

Various methincyanines carrying a substituent on the chain are described and their absorption maxima compared with those of the parent dyes. On substitution there are large bathochromic shifts for methyl, 2-benzothiazolyl, phenyl, and *p*-nitrophenyl; for carbethoxy, in the thiacyanine series the shifts are also bathochromic but smaller, whilst in the thia-2′-cyanine series they are hypsochromic. Introduction of substituents into the *a*-position in the chain of styryl dyes causes hypsochromic shifts of the absorption maximum. H.H.H.

Colour of Organic Compounds. VIII—A Comparison of Isomeric Dyes from 3:7*a*-Diazaindan-1-one and -2-one
E. B. Knott
J.C.S., 1360–1364 (June 1956)

3:7*a*-Diazaindan-1-one (I), obtained by cyclising *N*-2-pyridylaminoacetic acid with PCl_3, contains a nucleophilic methylene C atom(*) and has been converted into methin and dimethin dyes. Differences between the absorptions of these dyes and their isomers derived from 3:7*a*-diazaindan-2-one (II) are explained on the basis of the author's colour rule (cf. Knott, *J.C.S.*, 1024 (1951)).



(I) (II)

H.H.H.

Cyanine Dyes derived from 2-Methylindolo(3′:2′-3:4)quinoline
F. G. Mann and A. F. Prior
J.C.S., 1331–1336 (June 1956)

The above indoloquinoline and its 1:2-dimethyl homologue readily give quaternary salts in which the reactive 2-methyl group condenses with suitable heterocyclic systems to give cyanine and azamethincyanine salts; these are photographic sensitisers and desensitisers respectively. H.H.H.

Iminazolenine Cyanine Dyes
G. F. Duffin and J. D. Kendall
Compt. rend. 27th Congr. intern. Chim. ind. (Bruxelles), 3 (1954):
Industrie Chim. belge, **20** (Spec. No.), 599–601 (1955):
Chem. Abs., **50**, 6981 (25 May 1956)

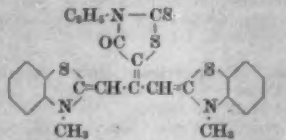
5:5-Disubstituted dithiohydantoins can be dialkylated to yield 2:4-bisalkylthioiminazolenines—

$$\overline{N{:}C(SR^1){\cdot}N{:}C(SR^2){\cdot}C}R^3R^4$$

which form quaternary salts. These salts in presence of Na acetate condense in the 2-position with compounds containing active CH_2 and in presence of triethylamine in both the 2- and 4-positions; they form *mero*cyanine dyes with compounds containing an intracyclic ketomethylene group in position 2, but not in position 4, unless the 2-group is a quaternised pyrazolone nucleus. The 4-alkylthio group of dinuclear *mero*cyanines can condense with compounds containing active CH_2.
C.O.C.

Trinuclear Cyanine Dyes
A. E. van Dormael
Compt. rend. 27th Congr. intern. Chim. ind. (Bruxelles), (3) (1954):
Industrie chim. belge, **20** (Spec. No.), 658–661 (1955):
Chem. Abs., **50**, 6981 (25 May 1956)

Trinuclear dyes prepared from the corresponding *meso*-thioalkyltrimethincyanines and *N*-ethylrhodanine, i.e. of type—



cannot, for steric reasons, have all three nuclei in the same plane. Probably the rhodanine nucleus and one benzothiazole nucleus involved in resonance structures are in the same plane, the other benzothiazole being outside it. The same resonance is indicated if the rhodanine nucleus is separated from the methin chain by a vinyl group. These dyes can be quaternised and condensed with a *cyclo*ammonium salt containing reactive CH_3 to give tetranuclear rhodacyanine dyes. Thus the quaternary salt of 2-(2-methyl-2-methoxyvinyl)benzothiazole gives a tetranuclear rhodacyanine dye containing a *meso*-methoxy group, or the *N*-ethylrhodanine gives a tetranuclear di*mero*cyanine. C.O.C.

Azamethin Dyes derived from Oxindole—I
M. S. Kisteneva
J. Gen. Chem. U.S.S.R., **26**, 1169–1175 (April 1956)

Oxindole and its 1-methyl, -ethyl, -phenyl, -acetyl, -hydroxy, -methoxy, -acetoxy, and -benzoyloxy deriv. are treated with *NN*-diethyl-*p*-nitrosoaniline with formation of azamethin dyes (1-substituted 3-*p*-diethylaminophenylimino-oxindoles). The absorption spectra of alcoholic soln. of the dyes are determined in the visible region. The position of the absorption max. varies with the nature of the 1-substituent, being displaced toward the longer waves by electronegative substituents and toward the short waves, though only slightly, by electropositive substituents. A.E.S.

Infrared Spectra of Chelating Agents—2-Phenacylpyridine Derivatives
R. F. Branch
Nature, **177**, 671–672 (7 April 1956)

2-Phenacylpyridine and a number of *para*-substituted derivatives (except hydroxy and amino) do not show

normal carbonyl or hydroxyl absorption in the solid state but give a weak diffuse hydroxyl absorption in chloroform and carbon tetrachloride. It is concluded that they exhibit conjugate chelation and exist largely in the enol form. A.J.

Phenazine Syntheses. V—Amines
D. L. Vivian
J. Org. Chem., **21**, 565–566 (May 1956)

1-Aminophenazine is prepared from 6-amino-2-nitrodiphenylamine, whereas 2-amino-8-dimethylamino-3-methyl- (the colour base of Neutral Red), 2-amino-8-dimethylamino- (the colour base of Neutral Violet), and 8-amino-2-hydroxy-phenazine are obtained via the corresponding chloro cpd. by interaction with ammonia. H.E.N.

Oxidation of Aminophenols
J. Eggers, H. Heckelmann, K. Lohmer, and R. Posse
Mitt. Forschungslab. Agfa Leverkusen–München, I, 95–121 (1955)

Thermochromism. IV—Dibenzodehydrodianthrones and Dehydrodianthrone-3-carboxylic Acid
W. Theilacker, G. Kortüm, H. Elliehausen, and H. Wilski
Chem. Ber., **89**, 1578–1592 (June 1956)

The following dibenzodehydrodianthrones are synthesised—2:3-6′:7′ (I), 3:4-5′:6′ (II), and 1:2-7′:8′ (III). All give yellow solutions in dimethyl phthalate (IV) at room temp., but above 200°c. the soln. of II is intensely green, though less so than an equivalent soln. of dehydrodianthrone itself, that of I is weakly olive-green, and that of III remains yellow. On exposure to light, pyridine soln. of I and II, but not of III, yield the corresponding dibenzo*meso*naphthodianthrones. The highly sol. methyl dehydrodianthrone-3-carboxylate is prepared, and the heat of rearrangement into its deeply coloured form is determined from absorption spectra at temp. of 50–210°c. to be 2·4 kcal./mole. Up to 45% soln. in IV could be obtained, and measurements of the magnetic susceptibility of these show that the deeply coloured form is not a diradical. In preparing 3:4-benzanthrone in 79% yield, reduction of 1:2-benzanthraquinone with sodium sulphite and alkali in glycol at 170°c. is used, whereas aluminium powder and sulphuric acid produce 1:2-benzanthrone. H.E.N.

Aromatic and Heterocyclic o-Dialdehydes. II—Synthesis of Thionaphthen-2:3-dialdehyde
W. Ried and H. Bender
Chem. Ber., **89**, 1574–1577 (June 1956)

Chloromethylation of thionaphthen, followed by conversion into the bispyridinium salt, reaction with *p*-nitrosodimethylaniline, and then with HCl, yields the 2:3-dialdehyde. It condenses with diethyl acetonedicarboxylate and with *cyclo*hexane-1:4-dione, forming an anthraquinone deriv. in the latter instance. 2:3-Dibromo- and 3-bromo-thionaphthen yield with butyllithium 2:3-dilithiumthionaphthen, which is converted into thionaphthen-2:3-dicarboxylic acid. H.E.N.

Simple Approximation to the Resonance Energies of Aromatic Molecules
A. L. Green
J.C.S., 1886–1888 (June 1956)

The simple dependence of the resonance energies of aromatic mol. containing only six-membered rings on the number of bonds in the mol., i.e. $E_{res} = kn$, has not been previously reported. If $k = \beta/3$, then the energy is given in terms of the molecular-orbital resonance integral β. The slightly greater resonance energies of angular mol. compared with those of their linear isomers can be corrected by addition of $m\beta/10$, where m is the number of bonds contained in one benzene ring in the mol. and linking two others, giving the complete formula—

$$E_{res} = \left(\frac{n}{3} + \frac{m}{10}\right)\beta$$

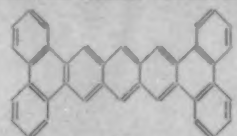
The calculation illustrated below for 4:5-benzopyrene yields $E_{res} = 8{\cdot}30\beta$, as compared with the accurate value $8{\cdot}34\beta$ and the approximate values of 8·50 (Wheland) and 8·40 (Daudel and Vroelant).

$n = 24;\ m = 3$

H.H.H.

1:2-3:4-8:9-10:11-Tetrabenzopentacene
E. Clar, W. Kelly, and W. G. Niven
J.C.S., 1833–1836 (June 1956)

The synthesis of the title substance (I) from (*a*) 1:2:3:4:5:6:7:8-octahydrophenanthrene, and also from (*b*) phenanthrene, and pyromellitic anhydride is described. The preparations of the mono- and the di-quinone of the hydrocarbon and of its adduct with maleic anhydride, are also included. The diquinone formed red needles, and gave a violet vat with alkaline sodium dithionite.



(I)

H.H.H.

Action of Acyl Cyanides on 2- and 1:2-Substituted Indoles. II—Derivatives of 2-o-Aminophenylindole
A. K. Kiang, F. G. Mann, A. F. Prior, and A. Topham
J.C.S., 1319–1331 (June 1956)

Acetyl cyanide reacts with 2-*o*-aminophenylindole to give the acetamidoindole, 2-methylindolo(3′:2′-3:4)-quinoline, and the isomeric 2-methylindolo(1′:2′-3:4)-quinazoline under various conditions. Benzoyl cyanide reacts similarly, and both cyanides give the corresponding acylaminoindoles and indoloquinolines with 2-*o*-aminophenyl-1-methylindole. H.H.H.

Spectroscopic Studies on Dyes. I—Association of Indigo Dyes in the Solid Phase
J. Weinstein and G. M. Wyman
J. Amer. Chem. Soc., **78**, 2387–2390 (5 June 1956)

In the visible spectrum the first absorption band of solid indigo exhibits a strong bathochromic shift from that of indigo in solution. Methyl and chlorine substituted in the 4- and 7-positions decrease the size of this shift. No such shift is seen with 5:5′:7:7′-tetrabromoindigo. It seems that in the solid state indigo dyes are associated, probably by hydrogen-bonding. Bulky substituents in the 4:4′ or 7:7′ positions prevent close approach of the CO and NH groups of neighbouring molecules, and thus interfere with formation of molecular aggregates. The absorption spectra of Cellophane and gelatin films dyed with indigo also show the dye to be present in the associated form. C.O.C.

New Synthesis of β-Pyrrolidones
R. Kuhn and G. Osswald
Chem. Ber., **89**, 1423–1442 (June 1956)

4-Ethoxypyrrole-2-carboxylic acid yields a brick-red azo dye with diazotised *m*-nitroaniline. 4-Hydroxypyrrole-2-carboxylic acid is readily oxidised to a deep blue pigment, practically insol., except in dil. NaOH. The alkaline soln. is decolourised by dithionite, and the analogy with indigotin is striking. H.E.N.

Organic Pigments

X—Manufacture of Copper Phthalocyanine—2
E. Koike
Repts. Govt. Chem. Ind. Research Inst. Tokyo, **50**, 16–18 (1955)

A product of very fine particle size was obtained by dissolving Cu phthalocyanine in H_2SO_4 to near saturation, slowly diluting with water to precipitate the sulphate, and then adding to boiling water to hydrolyse and precipitate the pigment.

XI—Synthesis of Phthalodinitrile in the Liquid Phase
E. J. Koike and M. Okawar
Ibid., 19–22

Phthalimide was treated with 28% NH_4OH to yield phthalodiamide. This was then dehydrated with a mixture of acetic anhydride and chlorobenzene, the

acetic acid being rapidly removed at low temperature as an azeotropic mixture with chlorobenzene. This gave almost 100% yield. The recovered solvent and dehydrating agent could be reused.

XII—Red Pigments from Aminochlorotoluene-sulphonic Acid Derivatives
E. Koike, S. Suzuki, M. Iida, and I. Tanakadate

Ibid., 149–154:
Chem. Abs., **50**, 9035 (25 June 1956)

Lake Red C and other pigments were obtained as Ca salts from several isomeric aminochlorotoluenesulphonic acids coupled with derivatives of 2-naphthol. Usually pigments from diazo components having SO_3Na *ortho* to NH_2 and Cl *para* to SO_3Na had useful properties. Where SO_3Na was *meta* to N:N there was poor fastness to moisture. Tests for brightness, purity, main absorption wavelengths, and fastness to light, acid, alkali, water, heat, alcohol, and chlorobenzene indicated that the products from 2-chloro-4-toluidine-5-sulphonic acid were the better pigments. C.O.C.

Photoelectric Phenomena with Copper Phthalocyanine
H. Baba, K. Chitoku, and K. Nitta

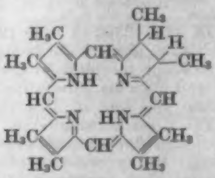
Nature, **177**, 672 (7 April 1956)

Copper phthalocyanine exhibits the following photoelectric properties—(i) photoconductivity, (ii) generation of e.m.f., and (iii) change of surface potential. Photocurrents obey Ohm's law and are proportional to the square root of the light intensity. A.J.

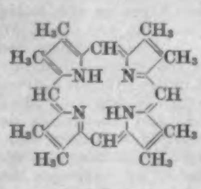
Chlorophyll and Related Substances. III—Synthesis of Octamethylchlorin
U. Eisner, R. P. Linstead, E. A. Parkes, and E. Stephen

J.C.S., 1655–1661 (June 1956)

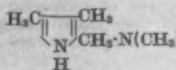
The syntheses of octamethylchlorin (I) and octamethylporphin (II) from 2-dimethylaminomethyl-3:4-dimethylpyrrole (III) are described. Metal (Cu, Mg) deriv. have been prepared, and their light-absorption data compared. Quantitative dehydrogenation of I and of its Mg deriv. by quinones has been studied.



(I)



(II)



(III)

H.H.H.

New Developments in the Chemistry of Porphin Pigments
K. Zeile

Angew Chem., **68**, 193–201 (1956):
Chem. Abs., **50**, 7900 (10 June 1956)

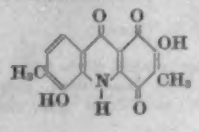
A review covering the porphin system, constitution of the active group in the oxygen-carrying enzyme, and uroporphyrin. 55 references. C.O.C.

Antibiotics from Actinomyces
H. Brockmann and H. Muxfeldt

XXXV—Actinomycins. XVI—Constitution of Despeptidoactinomycin

Chem. Ber., **89**, 1379–1397 (June 1956)

The hydrolysis of actinomycins with barium hydroxide splits off the peptide and alters the chromophore to yield a red, crystalline despeptidoactinomycin $C_{16}H_{11}O_5N$. Its constitution is shown to be—



XXXVI—XVII—Synthesis of Despeptidoactinomycin

Ibid., 1397–1402

The constitution assigned is confirmed by synthesis. H.E.N.

2-(3:4-Dihydroxyphenyl)ethylamines containing 3-, 4-, and 5-^{14}C respectively in the Study of Melanin Formation
G. A. Swan and D. Wright

J.C.S., 1549–1557 (June 1956)

The syntheses of the title cpd. are described. During melanin formation it is found that 29·8, 27·2, and 3·5% of the CO_2 evolved arise from the 3-, 4-, and 5-positions, respectively, of the benzene ring. A comparison of the specific activities of the melanins with those of their precursors suggests that approx. one unit in five in the polymer has undergone oxidative fission, with the loss of (probably) $C_{(4)}$, $C_{(5)}$, and $C_{(6)}$ of the indole nucleus. The results support the structure of melanin suggested by Bu'Lock and Harley-Mason (*J.C.S.*, 703 (1951)) (involving coupling of indole units between positions 3 and 7), with this oxidation occurring as a side-reaction. H.H.H.

Fluorescent Brightening Agents and their Influence on the Skin and Body Functions
W. Schneider

Berufsdermatosen, **3**, 201–206 (1955):
Chem. Abs., **50**, 8942 (25 June 1956)

Skin patch tests made with various fluorescent brightening agents (derivatives of diaminostilbenedisulphonic acid) gave negative skin patch tests. No eczematogenic effects were seen unless ultraviolet radiation or an abrasive action was added. No oestrogenic activity caused by the stilbene molecule was noticed. C.O.C.

Pearl Essence—References 1939–1954.

Science Library Biographical Series No. 735 (1955)

This list of 34 references to the literature and patents supplements No. 696. C.O.C.

Nepheline Syenite, an Extender Pigment for Paints
W. N. B. Armstrong and V. K. Croutch

Canadian Chem. Processing, **39**, (11), 132–134 (1955):
Chem. Abs., **50**, 7475 (25 May 1956)

A description of the pigment and results of weathering trials on paints containing it. C.O.C.

Structure of Luminescent Zinc Oxide
N. Riehl and H. Ortmann

Z. Elektrochem., **60**, 149–151 (1956):
Chem. Abs., **50**, 8332 (25 June 1956)

The green luminescence of ZnO is caused by sites of O deficiency, which must be formed during crystal growth. C.O.C.

Chemical Nature of Yellow Earth Pigments (Ochres)
N. P. Shmatkova

J. Appl. Chem. U.S.S.R., **28**, 687–693 (July 1955)

PATENTS

Diazo Coupling Components for Use in Diazotype Material
Kalle & Co. *BP* 750,068

The diazo compounds of compounds of formula—

$$H_2N{\cdot}Ph{\cdot}NR^1{\cdot}[CH_2]_n{\cdot}X{\cdot}R^2$$

(Ph = subst. or unsubst. phenylene; X = O, S, or SO_2; R^1 = H or Alk of 1–3 C; R^2 = subst. or unsubst. aromatic radical; n = 2 or 3), e.g. *N*-ethyl-*N*-*β*-*p'*-chlorophenoxyethyl-*p*-aminobenzenediazonium chloride, are light-sensitive and have very high coupling activity, making them useful in diazotype material for semi-wet development. C.O.C.

Colour Formers
Anken Chemical & Film Corpn. *USP* 2,718,466

Colour formers are produced by the stepwise condensation of amino compounds with halogen derivatives of triazine. Thus by treating 2 mol. of trichlorotriazine with 1 mol. of an acid-substituted aromatic diamine at 0–3°c. the following compound is obtained—

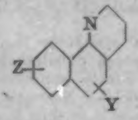
(R = aromatic or heterocyclic; A = carboxylic or sulphonic acid substituent). This is condensed in a second stage to introduce a coupling component into the molecule. Thus when 1 mol. of the above compound is treated at 25–40°c. with 2 mol. of an amino compound containing a coupling group, one Cl in each triazine ring is replaced by NHZ (Z = group of > 5 C and may contain a radical which couples with the oxidation products of a primary aromatic amino colour developer to form a dye). In a third stage additional coupling components are introduced, preferably by introduction of 2 mol. of a substituted amine of 10–12 C by condensing under reflux to yield a compound in which the remaining 2 Cl are replaced by NHY (Y = a coupling group which may contain a radical of > 5 C).
C.O.C.

Intermediates for Anthraquinone Dyes
American Cyanamid Co. *USP* 2,717,255

1-Halogeno-2-nitroanthraquinone on nitration yields a mixture of only two isomers, viz. 1-chloro-2:5- and 1-chloro-2:8-dinitroanthraquinone. They are similar in their physical and chemical properties and so need not be separated. The reaction product may be reduced directly to the diamino compounds, which are intermediates for preparing aminoanthraquinone-1:2-azoles, which themselves are intermediates for dyes, e.g. those described in *USP* 2,655,502 (J.S.D.C., **71**, 262 (1955)).
C.O.C.

Benzo(H)quinolinols as Azine Cyan Colour Formers
General Aniline *USP* 2,717,831

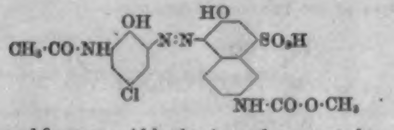
Compounds of formula—



(Y = OH, NH_2, or $NH{\cdot}SO_2{\cdot}R$; R = Alk or subst. or unsubst. Ar; Z = H, OH, amino (which may be substituted by alkyl, aryl, heterocyclic, acid) or aromatic carbonamido), e.g. benzo(H)quinolin-5-ol, couple rapidly with the oxidation products of a 2:4-diaminometanilic acid to produce brilliant cyan azine dye images.
C.O.C.

Grey and Olive Monoazo Chrome Dyes
Gy *BP* 751,974

Diazotised 6-acylamino-2-aminophenols having an electron-attracting group in the 4-position (e.g. NO_2, CN, $SO_2{\cdot}NH_2$) are coupled with acylamino-2-naphtholmonosulphonic acids in the 1-position to give grey and olive afterchrome dyes for wool and polyamide fibres. The acyl groups present are the radicals of organic carboxylic acids or carbonic acid half ester radicals or carbonic acid radicals. Thus 2-amino-4-chloro-6-nitrophenol is *N*-acetylated, and the nitro group then reduced to give 6-acetylamino-2-amino-4-chlorophenol, which is diazotised and coupled with 2-carbomethoxyamino-6-naphthol-8-sulphonic acid in presence of soda ash, ammonia, and pyridine, to give the monoazo compound—



It dyes wool from an acid bath wine red, converted to grey on afterchroming.
E.S.

Monoazo Dyes for Polyacrylonitrile Fibres
Purdue Research Foundation *USP* 2,717,823

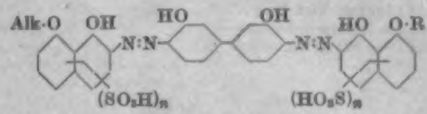
In preparing monoazo dyes to have satisfactory affinity for polyacrylonitrile fibres the amine to be diazotised must contain no substituent of a highly hydrophilic nature, and the coupling component must contain *meta* to the amino or phenolic group at least one substituent which is not highly hydrophilic; e.g. aniline, anisidine, or picramic acid is diazotised, and coupled with resorcinol or phloroglucinol to yield orange-to-red dyes.
C.O.C.

Monoazo Lake Pigments
BASF *BP* 751,447

Monoazo compounds obtained by diazotising aniline-*o*-sulphonic acids containing at least one halogen atom and/or at least one nitro group in the benzene nucleus and coupling with arylides of 3:2-hydroxynaphthoic acid are laked with salts of alkaline-earth metals or of Mn to give pigments insoluble in the usual organic solvents. Thus 4-amino-2-chlorotoluene-5-sulphonic acid is diazotised and coupled with the *o*-anisidide of 3:2-hydroxynaphthoic acid dissolved in aq. NaOH. The monoazo compound so formed is laked at about 80°c. with aq. $MnCl_2$ to give a yellow–red pigment fast to light and overspraying.
E.S.

Blue Metal(Copper)-complex Disazo Direct Dyes
FBy *BP* 751,263

The copper complexes of disazo compounds—



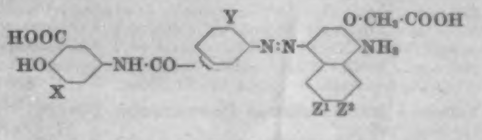
(R = H or Alk; *n* = 1 or 2) are blue direct dyes of good fastness to resin finishes. They are prepared by coupling tetrazotised 3:3′-dialkoxy(or dihydroxy or dichloro)-benzidine with 1 mol. of a 1-alkoxy-8-naphtholmono(or di)sulphonic acid and with 1 mol. of a like coupling component or a 1:8-dihydroxynaphthalenemono(or di)-sulphonic acid, followed by appropriate treatment with copper compounds. Thus tetrazotised dianisidine is coupled with 2 mol. of 1-ethoxy-8-naphthol-3:6-disulphonic acid in presence of soda ash, NaOH, and pyridine. By coppering with elimination of the CH_3 groups a bright blue direct dye is formed.
E.S.

Red Disazo Leather Dye
BASF *BP* 751,996

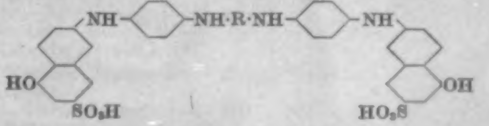
The disazo dye obtained by coupling tetrazotised 4:4′-diamino-2:2′-dimethyldiphenylmethane with 1 mol. of Schäffer's acid and 1 mol. of R acid, unlike the corresponding dyes in which 2 mol. of either one of these coupling components is coupled with this tetrazo compound, has very good solubility in water and dyes leather a brilliant brick-red full surface colour.
E.S.

Blue Copperable Tetrakisazo Direct Dyes
Gy *BP* 751,386

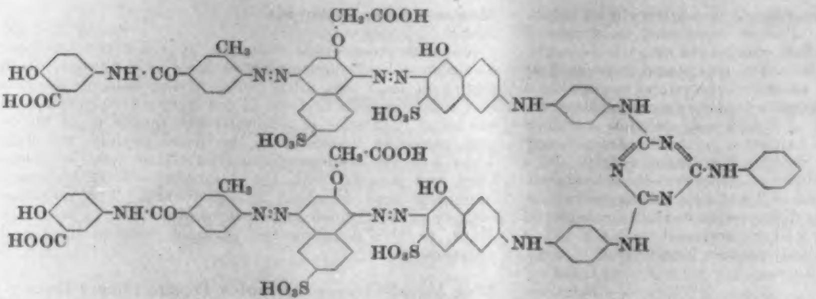
Two mol. of aminoazo compounds of the type—



(X = H, Hal, CH_3, or SO_3H; Y = H, Hal, CH_3, or $O{\cdot}CH_3$; one Z = H, the other Z = H or SO_3H) are diazotised, and coupled with 1 mol. of a compound—



(R = a bridging member linking the N atoms with the aid of a bivalent radical of a dibasic acid of > 1 C) to give blue direct dyes which may be coppered in the dyebath or on the fibre. Thus 5-(4-amino-3-methylbenzoylamino)-salicylic acid is diazotised, and coupled in presence of acetic acid with 1-amino-2-carboxymethoxynaphthalene-6-sulphonic acid. The aminomonoazo compound so formed is diazotised and coupled with the condensation product from 1 mol. of cyanuric chloride, 1 mol. of aniline, and 2 mol. of *N*-*p*-aminophenyl-J acid to give the tetrakisazo compound—

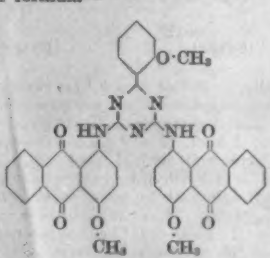


onate (1 mol.) is dissolved in the minimum of boiling acetic acid, and pyridine (4 mol.) and 1-aminonaphthalene-8-sulphonic acid (slightly < 1 mol.) are added; boiling for 5 min. is followed by pouring into a large volume of ethyl alcohol. The precipitated dye is filtered off and, after being washed with acetone, is ready for use. C.O.C.

It dyes cellulose fibres pure blue, changing only slightly in hue on aftercoppering. E.S.

Red Triazine Vat Dye
American Cyanamid Co. *USP* 2,719,154

The dye of formula—



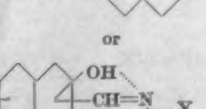
is useful both as a vat dye and as a pigment, yields bright reds at all concentrations, and builds up well on the fibre to yield a deep true red. It may be produced simply and cheaply in excellent yield by condensing 2-*o*-methoxyphenyl-4:6-dichlorotriazine with 2 mol. of 1-amino-4-methoxyanthraquinone. C.O.C.

Claret to Reddish-violet Azoic Dyes and Pigments
FH *BP* 750,414

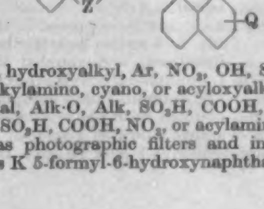
By coupling diazotised 4-*N*-alkyl-*N*-*cyclo*hexylsulphonamides of 2:5-dimethoxyaniline with suitable 3-hydroxy-2-naphthoarylides on the fibre, claret to reddish-violet azoic dyeings are obtained, of better fastness to peroxide than those described in *BP* 634,390, 332,932, and 331,247 (J.S.D.C., **66**, 386 (1950); **46**, 385, 417 (1930)), which do not contain the *N*-alkyl-*N*-*cyclo*hexylsulphonamide group. Or the coupling may be carried out in substance to give fast pigments. Thus cotton yarn is impregnated with a soln. of 3-hydroxy-2-naphtho-5′-chloro-2′:4′-dimethoxyanilide in aq. NaOH, and developed in a diazo solution prepared from 2:5-dimethoxyaniline-4-*N*-*cyclo*hexyl-*N*-ethylsulphonamide to give a bright claret. E.S.

Yellow Schiff's Bases as Photographic Filters
General Aniline *BP* 750,031

Compounds of formula—



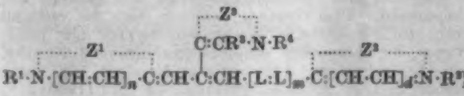
or



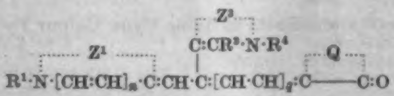
(X = H, Alk, hydroxyalkyl, Ar, NO_2, OH, SO_3H, COOH, acylamino, alkylamino, cyano, or acyloxyalkyl; Z = N or CH; Y = Hal, Alk·O, Alk, SO_3H, COOH, NO_2, or CN; Q = H, Hal, SO_3H, COOH, NO_2, or acylamino) are yellow dyes useful as photographic filters and in antihalation layers. Thus K 5-formyl-6-hydroxynaphthalene-2-sulph-

***mero*Cyanine Dyes containing a Chain Pyrryl Group**
Eastman Kodak Co. *USP* 2,719,151

Dyes of formula—



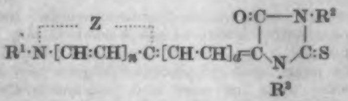
or—



(R^1 and R^2 = Alk; R^3 and R^4 = H, Alk, or Ar, or together = atoms to complete a pyridine nucleus; Z^1 and Z^2 = atoms to complete a 5- or 6-membered ring; Z^3 = atoms to complete a pyrrole nucleus; X = acid radical; L = subst. or unsubst. methin; n and d = 0 or 1; m = 1 or 2; q = 1, 2, or 3; Q = atoms to complete a 5- or 6- membered ring), e.g. 9-(1-ethyl-2:5-dimethyl-3-pyrryl)-3:3′-dimethylthiacarbocyanine iodide, have photosensitising properties. C.O.C.

***mero*Cyanine Dyes containing a 2-Thiohydantoin Nucleus**
Eastman Kodak Co. *USP* 2,719,152

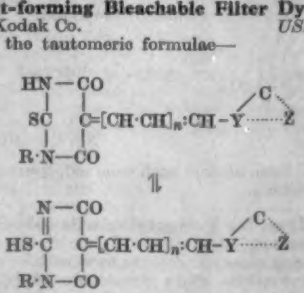
Dyes of formula—



(R^1 = Alk; R^2 = Alk, *cyclo*alkyl, or aralkyl; n = 0 or 1; d = 0, 1, or 2; R^3 = acyl; Z = atoms to complete a 5- or 6-membered ring), e.g. 1-acetyl-5-[(3-ethylbenzoxazolin-2-ylidene)-ethylidene]-3-methyl-2-thiohydantoin, may be used as photographic sensitisers. C.O.C.

Silver-salt-forming Bleachable Filter Dyes
Eastman Kodak Co. *USP* 2,719,088

Dyes of the tautomeric formulae—



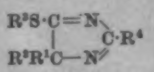
(R = H, Alk, or phenyl; Y = C or N; n = 0, 1, or 2; Z = atoms to complete a 3-pyrrole or 1-(1:2:3:4)-tetrahydroquinone ring) form silver salts which can be discharged and do not need solubilising groups to make them removable by washing. C.O.C.

Polymethin Dyes
Kodak *BP* 751,318

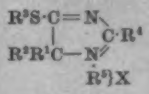
Structural formulae are given of 23 non-ionised dyes made by the process of *BP* 544,645 (J.S.D.C., 58, 214 (1942)).
C.O.C.

Cyanine Dyes
Ilford *BP* 749,191

Preparation of intermediates of formula—



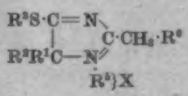
and their quaternary salts of formula—


(I)

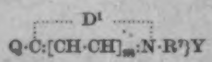
(R^1 and R^2 = same or different Alk or aralkyl or together with the C atom to which they are attached form an aliphatic carboxylic ring; R^3 = Alk; R^4 = hydrocarbon; R^5 = Alk; X = acid group) is described.

BP 749,189

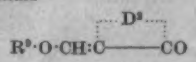
Cyanine dyes are formed by reaction of a compound of formula—



(R^6 = H or Alk) with a compound of formula—



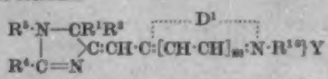
(m = 0 or 1; R^7 = Alk; Y = acid radical; D^1 = atoms to form a 5- or 6-membered ring; Q = SR^8, $CH{:}CH{\cdot}S{\cdot}R^8$ (R^8 = Alk or aralkyl), or acetanilidovinyl) or with a compound of formula—



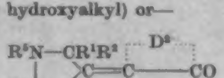
(D^2 = atoms to complete a heterocyclic nitrogen keto-methylene ring; R^9 = Alk).

BP 749,190

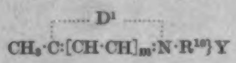
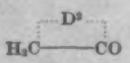
Dyes of formula—



(R^{10} = Alk or hydroxyalkyl) or—


(II)

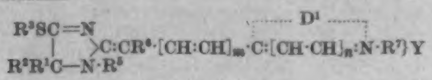
are obtained by condensing compounds of formula I with compounds of formula—

 or 

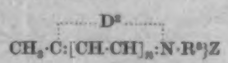
in presence of a basic condensing agent.

BP 749,192

Polynuclear dyes are obtained by condensing compounds of formula—



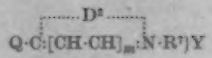
with compounds of formula—



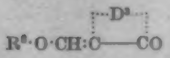
(Z = acid radical).

BP 749,193

Polynuclear dyes are produced by reaction of a compound of formula II with one of formula—



or—



(D^2 = atoms to complete a heterocyclic nitrogen keto-methylene ring).
C.O.C.

Carbon Black
Phillips Petroleum Co. *USP* 2,719,135

Method of separating the pigment from furnace effluents.
C.O.C.

Dispersions of Carbon Black
Rohm & Haas Co. *BP* 752,205

An aqueous dispersion of carbon black is made by using as dispersing agent 0·5–4·0% (on wt. of pigment) of a water-soluble salt of a copolymer of equimolecular proportions of maleic anhydride and an unsaturated hydrocarbon having an active olefinically unsaturated linkage and containing 5–10 C. The copolymer must have mol. wt. < 5000 and viscosity (as 35% soln. in an inert organic solvent) < 100 centipoises at 25°C. Such dispersions have pH 7–12 and are suitable for use in the fields of paper, cement, water-base paints, coating compositions, silk, rayon, and rubber.
C.O.C.

Composite Titanium Dioxide Pigment for Use in Lithographic Inks
American Cyanamid Co. *USP* 2,717,246

Titanium dioxide can be made suitable for use in lithographic inks by first coating it with a water-insoluble hydrous oxide of a multivalent metal and then with a polyorganosiloxane.
C.O.C.

Carbon Black— Process and Apparatus for Collection and Separation (I p. 443)
Pigments (V below)
Staining of Wool by Bacterial Pigments (VI p. 455)
Dyeing and Printing Polyacrylonitrile Fibres with Oxazine Dyes (VIII p. 459)
Baysikal K (FBy) and other Calcium Silicates as Fillers for Paper (XI p. 464)

V—PAINTS; ENAMELS; INKS

PATENTS

Heat-fugitive Yellow Coating Compositions
DuP *USP* 2,719,090

Incorporation of a heat-fugitive yellow colouring matter, e.g. 4-dimethylaminoazobenzene, 4-aminoazobenzene→phenol, *m*-nitro-*p*-toluidine→acetoacetanilide, 4-aminoazobenzene, and aniline→phenol, is used to offset the yellowness which occurs in organic films or coatings when they are heated.
C.O.C.

Pigments
R. C. Switzer and J. L. Switzer *BP* 748,484

Urea-type amide condensates have strong affinity for many soluble dyes and considerable attraction and enveloping action for many dispersible pigments. They are extremely friable, have low oil absorption, and, used as pigments in paints or printing inks, they are free from the undesirable thixotropic qualities of products of high mol.wt. Being non-resinous, they do not scratch engraved printing plates.
C.O.C.

Flatting Agents for Coating Compositions
Monsanto *USP* 2,717,214

Silica gels and aerogels in coating compositions can be prevented from tending to settle to form hard gummy cakes by incorporation of a non-ionic surface-active agent.
C.O.C.

Pigmented Chips
Monsanto *USP* 2,718,513

Chip-type pigment dispersions especially suitable for use in preparing pigmented coating compositions are obtained by thoroughly mixing under shearing stress a pigment, a copolymer of a vinyl compound of formula $R{\cdot}CH{:}CH_2$ (R = subst. or unsubst. phenyl) with a secondary alkyl half ester of an ethylene-$\alpha\beta$-dicarboxylic acid, and a plasticiser. After mixing is complete, e.g.

after 2–4 passes through a two-roll mill having heated rolls, the plastic mass on cooling becomes brittle and is readily broken into chips of suitable shape and size. C.O.C.

Coating Compositions
DuP *BP* 752,238

Uncured halogenosulphonated polyethylene is used as the base. After being applied and cured, the resultant film is insoluble in any organic or inorganic solvent. C.O.C.

Coating Compositions
J. C. Zola *BP* 750,605

One or more coating materials are dispersed in aqueous medium in presence of a gum, a cellulose derivative, a carbohydrate, a water-soluble synthetic organic material, or an inorganic colloid as stabilising agent in the aqueous phase. The particles of the coating material have minimum size 50 μ. C.O.C.

Daylight-fluorescent Colours
Auergesellschaft *BP* 750,192

Pastes or solutions made up of an alkyd resin soluble in aqueous alkali and 0·05–2·0% (on wt. of resin) of a water-soluble dye of the rhodamine group are readily miscible with aqueous binders. Thus phthalic acid–pentaerythritol resin (300 g.) is pasted with water (700), and then 25% ammonia (100 g.) is slowly added with constant stirring. To the resulting solution are added Rhodamine B (1·3), Rhodamine 6 GDN (1·3), and Thioflavine T (6) followed by silicic acid (100). This gives a composition having good red fluorescence in daylight. C.O.C.

Coatings of Calcium Oxychloride
Evode *BP* 749,743

A mixture of $CaCl_2$ and/or $MgCl_2$, $Ca(OH)_2$, and water is used. The amount of $Ca(OH)_2$ should be at least sufficient to form the hydrated oxychloride $Ca_4Cl_2O_{13}H_{20}$, and the water in such excess that there is not more than slight formation of this oxychloride until the water begins to evaporate after the mixture has been applied to the surface to be coated. C.O.C.

Pigment for Use in Photoengraving or Lithography
F. A. Grady *USP* 2,719,092

A mixture of a blue-absorbent material, an ultraviolet-absorbent material, and carbon black constitutes a pigment having the same artistic characteristics as commercial artists' lampblack but having selectively high light-absorption properties with respect to light at predetermined wavelengths and so useful for production of half-tone negatives in photoengraving. C.O.C.

Oil-in-water, Pigment-in-oil Coating Compositions
Sherwin-Williams Co. *USP* 2,719,133

Water-reducible, glossy coating compositions are prepared by incorporating some water in a pigment whose surface has been treated to render it oleophilic, dispersing the pigment in some or all of the oil so as to produce a water-in-oil, pigment-in-oil dispersion, and then converting it to a pigment-in-oil, oil-in-water emulsion. Pigments of 0·2–0·5 μ. particle size, especially TiO_2, are particularly suited for making such compositions. C.O.C.

Non-toxic Water-insoluble Paints
Fred Fear & Co. *USP* 2,719,091

A paint suitable for application to children's toys, etc. contains an aluminium lake of a certified colour (1–20% by wt.), a non-toxic resin (5–60), and an edible essential oil of the flavouring oil variety (30–60). C.O.C.

Emulsified Ionically Cross-linked Resins as Surface Coatings, as Impregnating Agents, and for Producing Foils
Rohm & Haas Co. *BP* 749,801

Aqueous dispersions containing a non-ionic emulsifying agent and a water-insoluble copolymer of an ester of acrylic or methacrylic acid and 0·25–25 molar % of carboxyl-containing monomeric units derived from acrylic, methacrylic, or itaconic acid, and 0·125–12·5 molar % of a multivalent-metal salt of a weak acid, a basic salt of a multivalent metal, an oxide or a hydroxide of Ba, Ca, Mg, or Sr, or a hydroxide of Al, Pb, or Zr, yield clean flexible films. They are suitable, if desired when opacified and/or pigmented, for coating leather, paper, wood, and metals. Fabric impregnated with them has better body and handle. The free films formed from them are flexible, strong, and resistant to oils and chemical attack. C.O.C.

Wrinkle-finish Coating Composition
New Wrinkle *BP* 750,190

A wrinkle-drying coating composition comprises an organic solvent, a terpolymer of vinyl chloride, vinyl acetate, and vinyl alcohol, and a resin obtained by cooking together glycerol (19% by wt.), phthalic anhydride (38), linseed-oil acids (21·5), and tung oil (21·5) or glycerol (12·28), phthalic anhydride (19·93), maleic anhydride (1·15), linseed-oil acids (16·94), resin (23·12), and tung oil (26·58). C.O.C.

Surface Coatings
G. J. Liebich Co. *BP* 748,497

A device for adding colouring matter to small tins of uncoloured liquid basic ingredients of the coating composition. C.O.C.

Aqueous Dispersions for Use in Coating Compositions and Paints (III p. 445)
Nepheline Syenite, an Extender Pigment for Paints (IV p. 450)
Composite Titanium Dioxide Pigment for Use in Lithographic Inks (IV p. 453)
Behaviour of Ink and Paper during Printing (IX p. 459)
Use of Polyamide Resins in Surface Coatings (XIII p. 466)

VI—FIBRES; YARNS; FABRICS

Progress in the Electron Microscopy of Textile Fibres
J. C. Guthrie

J. Textile Inst., **47**, P 248–P 268 (April 1956)

Principles of electron microscopy are briefly described, and techniques, including reflection methods, are surveyed. The effects of various treatments on the skin of fibres are discussed, together with work carried out on fibrillar structure. There are 18 micrographs and 155 references. J.W.B.

Effects of Changes in the Structure of Cotton Cellulose upon the Qualities of Cotton Products
W. M. Scott

J. Textile Inst., **47**, P 235–P 247 (April 1956)

A survey is presented, with 38 references, of the physical and chemical properties of cotton. Particular attention is given to esterification, etherification, cross-linking and the application of polymers, and the changes, e.g. in heat resistance, rotproofing, and dye affinity, which are induced by such reactions. J.W.B.

Oxidation of Cotton Yarn by Periodate under Mechanical Conditions that oppose Swelling
T. P. Nevell

J. Textile Inst., **47**, T 287–T 297 (May 1956)

Plain and mercerised softly twisted 4-fold cotton yarns are oxidised, loosely and under conditions permitting no shrinkage, in the dark at 20°C. for different times with 0·01M. and 0·1M. sodium metaperiodate solutions. Degree of oxidation, expressed as oxygen consumption, and subsequent tensile strength, extensibility, and hygroscopicity are measured. Owing to the great swelling produced in the cotton fibres during the later stages of oxidation, a high tension is developed in the rigidly held yarn, resulting in a more compact structure. Yarn so oxidised is stronger than yarn oxidised to a similar extent but free to shrink. The relation between breaking load and degree of oxidation is complex, this being ascribed to the separate and opposing effects of changing yarn structure and chemical modification. Mercerising under tension prior to oxidation reduces the effect on yarn structure, since the mercerising itself induces structural and tensile changes. Prevention of yarn shrinkage also retards the later stages of the reaction. X-Ray photographs and hygroscopicity measurements show that cellulose under tension suffers less disorientation during periodate oxidation. J.W.B.

Hydrophilic Character of Cellulose Fibres and their Reactivity in Formylation and Acetylation Reactions
N. I. Klenkova

J. Appl. Chem. U.S.S.R., **29**, 393–401 (March 1956)

The degree of swelling in water, the heat of swelling, and the regain at 100% R.H. are determined for native

(cotton linters, ramie), mercerised, and regenerated (viscose) cellulose fibres and for partly hydroxyethylated linters. These properties, and also the degree of swelling in 98% formic acid, are found to be directly related to the rate of formylation by 98% formic acid at 40°C., this being e.g. higher for mercerised than for unmercerised linters, and still higher for viscose rayon. On the other hand, mercerised and regenerated celluloses are much less reactive than native fibres in the reaction of acetylation with a mixture of acetic acid, acetic anhydride, and sulphuric acid; correspondingly, the degree of swelling in acetic acid is much less for the former than for the latter fibres. When the fibres are first swollen in water and the water is then displaced by glacial acetic acid, the swelling of the mercerised and the regenerated fibres and the rate at which they are acetylated are greatly increased. The bearing of this and previous work by Klenkova *et al.* (see J.S.D.C., **67**, 352 (1951); **70**, 315 (1954)) on fibre structure is discussed— for high reactivity not only an open structure and weak interaction between molecules are necessary, but also the presence of capillary spaces sufficiently large for the penetration of reagents into the structure. A.E.S.

Properties of Solutions of Cellulose Xanthates of Low Degree of Substitution—II
E. A. Abramova
J. Appl. Chem. U.S.S.R., **29**, 384–393 (March 1956)

A further discussion is given of the properties of weakly xanthated celluloses and of films and fibres derived from them; see J.S.D.C., **72**, 396 (Aug. 1956). A.E.S.

Heat of Wetting of Viscose Rayon
Ya. V. Pak and Kh. U. Usmanov
Kolloid. zhur., **18**, 233–236 (March–April 1956)

In an improved method for the determination of heats of wetting, the sample is exposed to a vacuum in a thin-walled glass ampoule for some hours, dry CO_2-free air is admitted, the ampoule is sealed off, and in the subsequent calorimetry the ampoule is broken under the surface of water. Results obtained by this method on viscose rayon are more accurate and reproducible than those obtained by earlier workers. The integral heat of wetting of ordinary viscose rayon is 24·8 cal./g., reduced to 19·8 by treatment in anhydrous air-free glycerol at 250°C. for 30 min. and to 16·3 by a similar treatment for 5 hr.; the value for rayon prepared by coagulation of viscose in an alkaline bath is 20·0. It follows that glycerol-treated rayon and rayon prepared by alkaline coagulation have more closely packed structures than ordinary viscose rayon. Integral heats of wetting are determined also on samples conditioned to various regains, and differential heats of wetting are derived from the results. The differential heat of wetting of ordinary viscose rayon at zero regain is 250 cal./g. A.E.S.

Aerobic Retting of Flax. I—Experimental
T. Madlung, H. Rämsch, and C. Kühne
Faserforsch. und Textiltech., **7**, 252–262 (June 1956)

Relationship between the Birefringence and the Chemical Composition of Flax Fibres
Z. A. Veinberg and D. Ya Tsvankin
J. Appl. Chem. U.S.S.R., **29**, 801–802 (May 1956)

Unbleached flax is given an alkali boil, a chlorite bleach, and a second alkali boil, and its refractive indices and cellulose, lignin, wax, nitrogen, hemicellulose, and ash contents are determined at each stage. As non-cellulosic impurities are removed, both the ordinary and the extraordinary refractive indices increase, and their difference (the birefringence) also increases (from 0·062 to 0·069). A.E.S.

Iodoform Reaction on Jute Hydrolysate
A. K. Sanyal
Text. Research J., **26**, 310–311 (April 1956)

Distillates from jute hydrolysates give the iodoform reaction. One of the compounds responsible for the reaction is acetol, possibly formed by cleavage of the non-reducing end-glucose residue of the cellulose chain and subsequent conversion of the hydroxymethyl group into a methyl group. Distillates from alkaline hydrolysates of bleached jute hemicellulose, jute lignin, D-glucose, and L-rhamnose also give the reaction. The high yield of acetol from L-rhamnose supports the postulated mode of formation of this substance. J.C.F.

Comparative Study on some Chemical Characteristics of Jute and Hibiscus Fibres
W. G. Macmillan, A. B. Sen Gupta, and A. Roy
J. Textile Inst., **47**, T 299–T 300 (May 1956)

Acetyl contents of *capsularis* and *olitorius* jute, and of *Hibiscus*, are in the ranges 3·6–3·8%, 3·1–3·25%, and 4·5–5·2% respectively. Lignin has a value 12–14·5% in jute but only 9·5–10·8% in *Hibiscus*, the latter also showing an appreciably greater yield of holocellulose as isolated by successive $NaClO_2$ treatments. No definite distinction is possible from values of carboxyl existing in different states, viz. free, occupied as cations, and present as ester. A significant difference is noted in the yields of total acidity, determined by NaOH neutralisation, the values for *Hibiscus*, *capsularis*, and *olitorius* being 128–146, 110–114, and 100–102 milli-equiv./100 g. respectively. The methoxyl content of lignin isolated from different fibres is practically the same, but those of the carbohydrate fractions of jute (0·85–0·95%) and *Hibiscus* (1·2–1·66%) are significantly different. J.W.B.

Physical and Chemical Properties of Bimli and Mesta Fibres and their Use in Differentiating these Fibres from Jute
D. B. Das, S. K. Guha, M. K. Mitra, and J. F. Wareham
J. Sci. Ind. Research (India), **14 B**, 407–412 (1955)

Staining of Wool by Bacterial Pigments
I. E. B. Fraser and A. P. Mulcock
Nature, **177**, 628–629 (31 March 1956)

The staining of Corriedale fleeces during periods of wet weather is shown to be caused by pyocyanine and its oxidation and reduction products produced by the single species *Pseudomonas aeruginosa*. A.J.

Components of Wool Wax

III—7-Oxocholesterol and the Alleged Presence of Cholestanol
A. H. Milburn and E. V. Truter
J.C.S., 1736–1739 (June 1956)

IV—The Identification of some Steroidal Derivatives
A. H. Milburn, E. V. Truter, and F. P. Woodford
Ibid., 1740–1743

Chromatographic Separation and Identification of Some Peptides in Partial Hydrolysates of Tussah Silk Fibroin
L. M. Kay, W. A. Schroeder, N. Munger, and N. Bart
J. Amer. Chem. Soc., **78**, 2430–2434 (5 June 1956)

Two-thirds of the Tussah silk fibroin molecule have been accounted for by 27 peptides isolated from its partial hydrolysate and by free amino acids in the hydrolysate. Apparently repetition of adjacent alanine residues is an important feature in Tussah fibroin, but there is little regularity in the arrangement of other amino acids. This contrasts sharply with *Bombyx* silk fibroin, in which, for the most part, glycine residues occupy alternate positions along the polypeptide chain. C.O.C.

Cold Drawing of Polymers—The Quasi-static Drawing of Polycapramide. III—Effects of Heat-treatments and Temperature Dependence of the Heterogeneous Structure in Polymers
H. Yumoto
Bull. Chem. Soc. Japan, **29**, 353–360 (April 1956)

Polycapramide is drawn after heat-treatment in the dry state at temperatures below 60°, between 60° and 120°, and between 120° and 180°C., and after treatment with water or water vapour below 50°, between 50° and 100°, and above 100°C. Densities and yield stresses are determined. The results are discussed in terms of changes in the heterogeneity of the polymer structure. It is suggested that crystallites of a β-form, defective crystallites of an α-form, and two kinds of amorphous regions exist. Temperatures at which micro- and macro-Brownian motion become effective in each of these regions are given for dried and water-steeped fibres. In drawing, flow between chains occurs in amorphous regions, but slip may be caused in one type of crystallite. W.R.M.

Structure of Synthetic Polyamide Fibres. VII—Differential Heat of Solution of Capron [6-Nylon] Fibre in Formic Acid
N. V. Mikhaĭlov and É. Z. Faĭnberg
Kolloid. zhur., **18**, 208–214 (March–April 1956)
Samples of Capron are exposed to a high vacuum in glass tubes; formic acid vapour is allowed to diffuse into the tubes for various periods, after which the tubes are sealed off; and the systems are allowed to come to equilibrium (several days). The uptake of formic acid is determined on some of the samples, and integral heats of soln. in formic acid are determined on other, parallel samples that have been conditioned in the same way (see J.S.D.C., **72**, 303 (June 1956)). Differential heats of soln. are derived from the data so obtained, and they are found to show behaviour similar to that previously observed by the authors for the wetting of Capron with water (*Kolloid. zhur.*, **16**, 2, 120 (1954))— the differential heat of soln. is const. up to a certain uptake of formic acid and then falls sharply to a lower value, which remains const. at still higher uptakes until the point is reached at which the integral heat of soln. becomes zero. At this point the uptake is 0·375 mole per basal mole of polymer for both undrawn and drawn fibres, which is close to values found for water at the corresponding point in adsorption experiments (0·443 for undrawn, and 0·375 for drawn fibres). The point at which the higher const. differential heat of soln. changes to the lower differs greatly for undrawn and drawn fibres (8·82 and 1·74% of formic acid, respectively). This fact is interpreted, as were the analogous results for the adsorption of water, as evidence for the existence of two kinds of hydrogen bonds in Capron— intra- and inter-molecular— most of the former being converted into the latter during cold drawing. The results indicate also that the intramolecular hydrogen bonds that remain in the drawn fibre are greatly strained and weakened (drawn fibre has much the higher differential heat of soln. at low uptakes). It is suggested that the physicomechanical properties of Capron fibre are determined not by amorphous–crystalline phase relationships, but by distribution and arrangement of hydrogen bonds of different types within the fibre. A.E.S.

Structure of Macromolecular Substances. XIII—Interaction of Acids with Polyamide Fibres
V. A. Myagkov and A. B. Pakshver
J. Appl. Chem. U.S.S.R., **29**, 774–783 (May 1956)
Measurements are made of the sorption of HCl (I) and naphthalene-2-sulphonic acid (II) at 20°C. and of Methyl Orange (III) at a const. pH of 8·5 at 97°C. on 6-nylon (mol.wt. 17,000; COOH content *a* 1·0 group per mol.; NH_2 content *b* 0·55 group per mol.). The results are interpreted on the basis of the simple ion-exchange equilibrium—

$$-NH_3^+OH^-\ (s) + A^-\ (l) \rightleftharpoons -NH_3^+A^-\ (s) + OH^-\ (l)$$

($-NH_3^+$ = terminal fibre cation; A^- = dye anion; s = solid phase; l = liquid phase). Manipulation of the equilibrium equation (const. K) shows that for the sorption of free acid a plot of $\log[x/(1 - a + b - x)]$ against $\log[A^-]$ ($x = [-NH_3A\ (s)]$) should be a straight line of slope 2 and intercept on the axis of ordinates of $-pK$. The experimental results for the free acids I and II are in close agreement with the theory. For III the plot should again be a straight line, though of different slope and intercept, and this is in fact found. When, however, the Gilbert–Rideal treatment is applied to these systems, it is found that there should be a linear relationship between x and $\sqrt{x(x - b + a)}/[H^+]$, whereas the actual plot is a complex curve. The equilibrium const. for the sorption of I, II, and III under the specified conditions are $2{\cdot}5 \times 10^7$, $4{\cdot}0 \times 10^9$, and $2{\cdot}5 \times 10^{11}$ respectively, i.e. they increase with increase in the size of the anion. A.E.S.

Heat Deterioration of Tyre Cords
S. P. Gundava
J. Textile Inst., **47**, T 298–T 299 (May 1956)
Continuous-filament 6,6-nylon and Terylene tyre cords, previously heat-set, are heated for 18 hr. at 150°C. in air and in N_2. Tensile strength measurements show losses of 25% (air) and 4% (N_2) for nylon, and < 4% for Terylene in both instances. Coating of nylon cords in an epoxy resin leads to negligible strength loss in air, the exclusion of which, as happens in the tyre itself, thus results in reasonable stability. J.W.B.

Polyvinyl Alcohol Fibres
G. B. Carpenter and O. L. Wheeler
Text. Research J., **26**, 317–322 (April 1956)
An account of the development of polyvinyl alcohol fibre (vinylon) production in Japan. Flow sheets are given and economic factors discussed. Comparative data on chemical stability, regain, and elastic properties are given. J.C.F.

Production of Synthetic Carbon-chain Fibres. I—Effect of the Molecular Weight of the Copolymer Saniv on the Conditions required for Fibre Formation and on Fibre Properties
Z. A. Zazulina and Z. A. Rogovin
Tekstil. prom., **16**, 18–20 (Feb. 1956)
Saniv copolymer, prepared by the emulsion copolymerisation of acrylonitrile and vinylidene chloride, is found to have an average mol.wt. of 475,000, and it is separated by fractional precipitation with alcohol from acetone soln. into three fractions, identical in chemical composition (40 : 60 by wt. of the respective monomers) and having average mol.wt. of 620,000, 290,000, and 130,000 respectively. Acetone soln. of equal viscosity are prepared from the three fractions and are extruded into a 4% aq. soln. of acetone. The spinning properties improve with reduction in mol.wt., breakage being reduced, the rate of spinning raised, and the maximum possible draft during spinning greatly increased. The mechanical properties of the finished fibre, particularly the resistance to repeated flexing, are very much worse for the fraction of highest mol.wt. than for the other fractions, but they are better for the middle fraction than for the fraction of lowest mol.wt., which indicates the existence of an optimum mol.wt. within the range investigated. A.E.S.

Improving the Strength of Khlorin Fibre
B. É. Geller
Tekstil. prom., **16**, 29–31 (March 1956)
Experiments on the drawing of Khlorin fibre [probably chlorinated polyvinyl chloride] in a current of hot air show that the greatest improvement in tensile properties is achieved at air temperatures of 140–180°C. The fibre so prepared begins to shrink when heated to a temp. that depends on drawing conditions (generally 70–80°C.), and it becomes capable of viscous flow at 100–120°C. It should be relaxed close to, but not above, the latter temp. A.E.S.

PATENTS

Acetylating Cellulose while retaining the Fibre Structure
T. Takagi *BP* 750,702
Cellulose is acetylated to 40–62% acetic acid content by weight, by impregnating it with an aqueous solution of an acetylation catalyst, treating with acetic acid vapour at 100–130°C. to replace the fibre water content by the acid, and finally treating with acetic anhydride vapour at 100–140°C. The process is particularly applicable to viscose rayon which has been permanently crimped, this crimp being retained after acetylation. C.O.C.

Continuous Manufacture of Crimped Fibres of Poly-6-hexanolactam
FH *BP* 750,652
A large number of single threads, e.g. a spinning cable or card sliver, containing 6–15% of monomeric or low-polymeric ε-caprolactam, are stretched, mechanically crimped, washed, in absence of tension, with water at 80–100°C. to remove the low-molecular portion of the lactam, and dried. C.O.C.

Polyacrylonitrile Fibres
Eastman Kodak Co. *USP* 2,719,134
Fibres having good moisture absorption, dyeability, improved flame resistance, and at the same time no reduction in sticking temperature or increase in shrinkage on heating are obtained from a copolymer of ≮ 80% acrylonitrile and another ethenoid monomer with addition of resinous, polymeric phosphonic acid diamides, e.g. a mixture of 60–95 parts of an acrylonitrile polymer or copolymers and 40–5 parts of a polymer containing the

recurring structural unit $-NR^2 \cdot P(O)R^1 \cdot NR^2 \cdot P(O)R^1-$ (R^1 = hydrocarbon; R^2 = H or Alk), e.g. polybenzenephosphonic acid diamide.

USP 2,719,136

Fibres of polyacrylonitrile containing ≮ 15% of a non-polymerisable copolymer of maleic anhydride and *iso*propenyl acetate or styrene have good affinity for organic dyes. C.O.C.

Acrylonitrile Copolymers stabilised against Discoloration by Heat

Monsanto *USP* 2,719,140

Addition of 0·1–3·0% of a magnesium alkyl maleate (Alk of 1–14 C), e.g. Mg octyl maleate, gives to acrylonitrile polymers improved resistance to discoloration by heat. C.O.C.

Acrylonitrile Fibres of Improved Dyeability

Eastman Kodak Co. *USP* 2,719,144

If a small proportion of the nitrile groups in polyacrylonitrile or polymethacrylonitrile are converted to *N*-substituted branched-chain alkylamide groups, i.e. to groups of formula $-CO \cdot NH \cdot CR^1R^2R^3$ (R^1 = H or CH_3; R^2 and R^3 = CH_3 or C_2H_5), the products have excellent affinity for available dyes and softening points above 200°c. C.O.C.

Acrylonitrile Fibres

Chemstrand Corpn. *BP* 751,637

Copolymers of acrylonitrile and ≮ 30% of a vinyl monomer containing a basic group, e.g. 2-vinylpyridine, have very good affinity for dyes. They can be obtained by emulsion polymerisation without evaporation occurring by using a mixture of an alkali-metal aromatic sulphonate and an alkali-metal aliphatic carboxylate as the emulsifying agent. C.O.C.

Selective Absorption of Optical Antipodes by Proteins—III (VIII p. 458)
Studies in Hydrogen-Bond Formation. V—Complex-forming Properties of Esters, and their Relation to the Adsorption Properties of Cellulose Acetate and other Polymers (VIII p. 458)
Electron-microscopic Investigation of the Viscose Process—I and II (XI p. 464)
Influence of Fibre Structure on the Nitration of Native Cellulose (XI p. 465)
Viscosity of Polyamide Melts (XIII p. 466)

VII—DESIZING; SCOURING; CARBONISING; BLEACHING

Wool Scouring with Organic Solvents

K. Kühnel

Textil Praxis, 11, 477–480 (May 1956)

Volatile organic solvents have been considered for extracting the grease from wool. In America benzene is used in certain mills with success. A comparison with normal detergent scouring is as follows: *advantages*—less fibre damage and felting, increased recovery of grease at lower cost, better control of residual grease, and extraction liquor can be used several times; *disadvantages*—special apparatus required, expensive equipment needed for solvent recovery, colour of scoured wool inferior, and quality of wool grease not so good. B.K.

Thermodynamical Investigations of Wetting and Detergency Phenomena

A. V. Dumanskii

Izvestiya Akad. Nauk S.S.S.R., Otdel. khim. nauk, 270–280 (March 1956)

A general review is given of the work of Dumanskii and his school on wetting and detergency phenomena (29 references). For a large range of sorbents (e.g. starch, cellulose, agar, gelatin, silica gel, soaps), the heat evolved when water becomes "bound" by the sorbent has the same value of ~ 80 cal. per gram of water, and this can be attributed essentially to the difference between the heat evolved in the formation of hydrogen bonds and the heat absorbed in the disaggregation of water. Determinations of heats of wetting enable estimates to be made of the amount of water that can be bound by a polymer (*m* moles per basal mole). For starch *m* = 3. For various fibrous celluloses *m* ≯ 2, many of the hydroxyls being screened; but it rises progressively as the cellulose is disintegrated by grinding and may attain the value 3. For 6-nylon fibre *m* = 0·5. For soaps *m* (moles per mole) depends on the nature of the fatty acid—for saturated acids, e.g. stearic, *m* = 1; for acids containing one double bond, e.g. oleic, *m* = 2; and for acids containing a double bond and a hydroxyl, e.g. ricinoleic, *m* = 3. For the wetting of saturated soaps with saturated hydrocarbons the heat evolved is proportional to the number of C atoms *n* in the fatty acid, being 0·065*n* cal. per g. of hydrocarbon. The presence of the double bond in oleic acid results in the screening of units of the chain by one another, and the heat of wetting of an oleate soap by a hydrocarbon has only one-half of the value given by the formula. The hydrophilic character of the hydroxyl present in a ricinoleate results in a further reduction in the heat of wetting by a hydrocarbon. For the salt of a fatty acid to have detergent properties when its soln. is applied to fabrics soiled with oil, it is necessary that the energy of the attachment of the oil to the fibre (e.g. cellulose) be less than the energy of the attachment of the oil to the soap. The heat of wetting of cellulose by various oils ranges from 0·35 to 0·46 cal. per g. of oil, and octanoic acid is the first of the series of fatty acids that has a heat of wetting by hydrocarbons appreciably greater than this value (0·52 cal. per g. of hydrocarbon). Soaps derived from fatty acids having $n < 8$ will therefore have no detergency effect. The wetting of clays and the adsorption of water and alcohol by silica gel are also discussed. A.E.S.

Interaction between Surface-active Agents and Proteins. II—Electrophoretic Investigation of the System Sodium Dodecyl Sulphate–Egg Albumin

K. Aoki

Bull. Chem. Soc. Japan, 29, 369–372 (April 1956)

Use of Silicones for Reproofing of Garments in Dry Cleaning

M. Morel

Teintex, 21, 282–291 (April 1956)

Practical details are given. S.R.C.

Decomposition of Sodium Hypochlorite—The Uncatalysed Reaction

M. W. Lister

Canadian J. Chem., 34, 465–478 (April 1956)

An examination of the kinetics of decomposition of alkaline soln. of sodium hypochlorite confirms the mechanism of Foerster and Dolch (*Z. Elektrochem.*, 23, 137 (1917)), i.e. a slow bimolecular decomposition to chlorite and chloride followed by a rapid reaction of chlorite with more hypochlorite to yield chlorate and chloride. Decomposition to chloride and oxygen is unimolecular and, in the absence of catalysts, much slower. Both rates are strongly influenced by ionic strength; variations in rate due to additions of chloride, hydroxide, or carbonate may be entirely explained by their effect on ionic strength. A.J.

Decomposition of Sodium Hypochlorite—The Catalysed Reaction

M. W. Lister

Canadian J. Chem., 34, 479–488 (April 1956)

Manganese and iron do not catalyse the decomposition of alkaline soln. of sodium hypochlorite, and are largely oxidised to permanganate and ferrate respectively. Cobalt, nickel, and copper catalyse the decomposition to oxygen and chloride, the rate being proportional to the concn. of catalyst but independent of the hypochlorite concn. for the first two, and proportional to the concn. of both catalyst and hypochlorite for copper. The decomposition to chlorate is not catalysed. Possible mechanisms are briefly discussed. A.J.

PATENTS

Bleaching Cellulosic Textiles

ICI *BP* 749,705

The goods, preferably in open width, pass continuously and rapidly through a hydrocarbon or chlorinated hydrocarbon to remove grease and wax. They then pass quickly through an aqueous bath of a peroxy compound at pH 11–12 and of alkalinity corresponding to ≮ 7·2 g. of NaOH per litre, and are then steamed. In the third and last stage they pass quickly through a second bath of aqueous peroxy compound at pH 9·5–11 and alkalinity corresponding to < 7·2 g. of NaOH per litre, and are then steamed to develop a full bleach. Alternatively, the second

and/or the third stage are carried out by immersing the goods in the bath at elevated temperature for a long period instead of passing them quickly through the bath and steaming. If this procedure is followed, then the alkalinity of the second bath corresponds to ≮ 3·1 and that of the third bath to < 3·1 g. of NaOH per litre. C.O.C.

Cotton Bleaching
Boehme Fettchemie *BP* 750,352

Treatment with bacteria or enzymes which decompose pectin can very well replace kier boiling. It can be carried out in the usual desizing bath. C.O.C.

Cotton Bleaching
Chicopee Manufacturing Corpn. *USP* 2,717,193

The material is treated in a bleaching bath containing a per compound as the bleaching agent at a temperature below that at which the bleaching agent is activated. This treatment continues until the bleaching agent has penetrated into the lumina of the fibres, after which the temperature is raised to activate the bath. The process is especially suitable for cotton of bad colour caused by the action of micro-organisms on the raw cotton. C.O.C.

Uses of Bentonite in the Textile Industry (X p. 462)
Cellulose Analysis and Bleaching Methods for Cellulosic Materials. VIII— Degrees of Bleaching of Unbleached Sulphite and Kraft Pulps (XI p. 464)

VIII—DYEING

Short Method of Dyeing Wool
A. A. Panicheva and B. M. Bogoslovskii
Tekstil. prom., **16**, 36–38 (May 1956)

Level dyeings are obtained on wool without prolonged treatment at the boil— and therefore with less fibre damage— by applying the dye, suitably insolubilised if necessary, as a fine dispersion, which is rapidly and evenly exhausted from the liquor at a low temp. When satisfactory absorption has occurred, the bath is raised to the boil, and suitable additions (e.g. dichromate) are made; boiling is for 10–20 min. The use of barium salts of acid and chrome dyes, of mordant dyes of the alizarin type, and also of some disperse dyes is referred to. Tests of dyeings of chrome dyes show that their fastness properties are not inferior to those of dyeings obtained in the usual way. A.E.S.

Selective Absorption of Optical Antipodes by Proteins— III
W. Bradley and R. A. Brindley
J.C.S., 1622–1627 (June 1956)

Wool which has previously combined with sulphuric acid or 1-*p*-sulphophenylazo-2-naphthol is found to combine with, and resolve, a reduced amount of mandelic or *p*-heptyloxymandelic acid. This indicates that the anions of the first two acids also become attached to the ammonium centres in wool, and that the numbers of sites on which the resolution of mandelate anions can occur is limited. Removal of the sulphuric acid by repeated contact with H_2O or aq. NH_3 restores the original capacity of the wool to combine with and resolve mandelic acid. Similar results are obtained with *m*-nitromandelic acid and 5-(2:4-dinitroanilino)-2-*p*-toluidinobenzenesulphonic acid. H.H.H.

Dyeing of Wool in Acid Dyebaths with 2:1 Metal-complex Dyes
R. Casty
Textil-Rund., 11, 328–334 (June 1956)

The use of Cibalan Salt S (Ciba) as a dyeing auxiliary is described and illustrated by exhaustion curves. The advantages of the acid–Glauber's salt technique and of the method using first ammonium sulphate and then acid plus auxiliary are compared. At pH 2·0–2·5, 1:1 metal complexes are recommended; from pH 3·5 to 5·0 the 2:1 complexes can be used with specific levelling agents; at neutrality 2:1 complexes can be dyed with ammonium salts, preferably with additions of the same auxiliaries. S.R.C.

Dyeing with Neutral-dyeing Metal-complex Dyes
H. R. Hirsbrunner
Textil-Rund., 11, 334–341 (June 1956)

Thermodynamic aspects are first considered, followed by short references to high-temperature dyeing, the "hot-dyeing" process for Irgalan (Gy) dyes, and the Steverlynck static-pressure process. S.R.C.

Spectrophotometric Studies on Metal–Dye Complexes. I— Reaction between Solochrome Violet RS (2-Hydroxy-5-sulphophenylazo-β-naphthol) and Tervalent Chromium
R. B. Bentley and J. P. Elder
J.S.D.C., **72**, 332–342 (July 1956)

An investigation has been made by spectrophotometric and chromatographic methods of the reaction between an oo′-dihydroxyazo dye and tervalent chromium salts. The two complexes formed have been separated chromatographically and their spectra measured. Equilibrium constants for the interconversion of the two complexes have been determined, together with the heat, free energy, and entropy changes for this reaction. AUTHORS

Accelerated Light Fading of certain Dyed Fabrics caused by Perspiration
C. H. Bayley and A. S. Tweedie
Canadian Textile J., **73**, 58–59 (1 June 1956)

Investigations into the light fading of local areas of garments have indicated that severe loss or change of colour is accelerated by perspiration. This has been confirmed by subjecting fabric to the new perspiration test (J.S.D.C., **71**, 335 (1955)) and then exposing it in a Fade-Ometer. The resultant fading was similar to that shown by the perspiration areas of uniform trousers which were the subject of complaints of unserviceability. One of the dyes in the fabric (submitted for test by a manufacturer) was a metal(Cu)-complex dye, the susceptibility of which to perspiration fading is mentioned in the appropriate S.D.C. fading test. A.H.

Measurement of Redox Potentials of Vat Dyes and its Practical Application
S. Hafenrichter
Textil-Rund., 11, 255–263 (May 1956)

The significance of the leuco potential in practical considerations such as the bleeding of vat-dyed stripes in kiering and the sensitivity of some dyes to over-reduction is discussed. A table of leuco potentials is given together with the best locations for redox-potential measurement in various vat-dyeing processes, including continuous treatments. S.R.C.

Disperse Dyes on Hydrophobic Fibres
C. L. Bird
J.S.D.C., **72**, 343–351 (July 1956)

Explanatory paper.

Studies in Hydrogen-bond Formation. V— Complex-forming Properties of Esters, and their Relation to the Adsorption Properties of Cellulose Acetate and other Polymers
F. M. Arshid, C. H. Giles, and S. K. Jain
J.C.S., 1272–1277 (June 1956)

Complex-forming reactions of compounds containing the grouping $CO·CH_3$ in aq. and non-aq. soln. indicate that esters act as monofunctional proton-donors, whereas diacetates are normally bifunctional, although when the two acetate groups are vicinal they interact, probably through a CH . . . hydrogen bond, and the compound is monofunctional. *N*-Acetylglucosamine appears to form bonds through the NH group; its OH groups are active in non-aq. solvents but not in H_2O. These data, obtained by measurements of dielectric constant, refractive index, and infrared absorption, are used for the interpretation of the adsorption behaviour of cellulose acetate, chitin, and Terylene, by means of suitable models. H.H.H.

Dyeing the Newer Man-made Fibres
P. J. Choquette
Canadian Textile J., **73**, 51–55 (6 April 1956)

A general survey of methods available for dyeing the newer fibres includes descriptions of high-temperature and "carrier" techniques. Methods for colouring polyvinyl alcohol fibre are also included. A.H.

Determination of the "Chemical-saturation Limit" of Polyamide Fibres for Acid and Direct Dyes— I
L. V. Golosova
Tekstil. prom., **16**, 25–26 (April 1956)

Experimental details are given of the application to synthetic polyamide fibres of A. E. Poraĭ-Koshits' method of determining the max. amount of an anionic dye that

can be taken up by salt-formation at the NH_2 groups of wool or silk (boiling with a soln. of the Na salt of the dye and a large amount of NH_4Cl and determining the NH_3 evolved). The method is applied to the dyeing of 6-nylon with three acid dyes and four direct dyes. Values of 0·048–0·053 mg.equiv. of dye per gram of fibre are obtained, corresponding to a mol.wt. of 20,600–18,800 for the fibre (the viscosimetric value is 18,940). A.E.S.

Fast-to-light Dyeings on Vinylon
R. Koch

Z. ges. Textilind., **58**, 317–318 (20 April 1956)

Application of neutral-dyeing metal-complex dyes, anthraquinone vat dyes, and esters of leuco vat dyes to vinylon (a formaldehyde acetal of polyvinyl alcohol of Japanese manufacture) is discussed. B.K.

Dyeing of Paper
H. A. Lips and D. P. Graham

Indian Pulp & Paper, (9), 523–528 (1955)

Theory and Practice in Dyeing and Sealing Anodised Aluminium
C. T. Speiser

Electroplating and Metal Finishing, **9**, 109–116, 128 (1956):
Chem. Abs., **50**, 8429 (25 June 1956)

An account of the mechanism and types of dye fixation on anodised aluminium, particular attention being paid to the influence of pH, temperature, time, and hardness of the water on both dyeing and sealing. Dyeing is best carried out at 140°F. for 15–20 min. and sealing at 212°F. for 30 min. Distilled water and dilute solutions of Co and Ni acetates are the best sealers. Numerous tables and charts together with 28 references. C.O.C.

PATENTS

Dyeing Wool with Complex Metal Compounds of Dyes
Gy *BP* 750,648

Wool is very quickly dyed directly, evenly, and thoroughly even at 80°C. or above with complexes of 2 mol. of monoazo or azomethin dye containing no acid water-solubilising group and 1 atom of a metal of atomic number 23–28. Thus slubbing (100) is put in a package-dyeing machine, and soft water (5000) circulated through it and heated with indirect steam. During the heating NH_4 sulphate (5) and 25% ammonia (1) are added. At 90°C. the steam is turned off, the liquor still circulated until (after 5 min.), the pH is 7·8. Then 0·2 part of the complex of 1 atom of Cr with 2 mol. of 4-chloro-2-aminophenol→2-naphthol-6-sulphonamide is added. The bath quickly exhausts and is then boiled for 30 min. to complete the dyeing, the wool being dyed a very level violet.
C.O.C.

Metachrome Dyeing
ICI *BP* 749,631

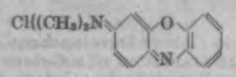
Use of a composition containing a chromable dye, a dichromate, and Na thiosulphate or hexamethylenetetramine as the reducing agent gives rapid and complete conversion of the dye into a complex containing 1 atom of Cr and 2 mol. of dye when the theoretical quantity of Cr compound is used. Thus K dichromate (15%), Na thiosulphate (15), NaCl (45), and 4-chloro-2-aminophenol-6-sulphonic acid→1-acetylamino-7-naphthol (25) are mixed. This composition (1 part by wt.) and NH_4 sulphate (2) are dissolved in water (5000), and loose wool (100) is added. The bath is brought to the boil in 30 min., and the wool dyed for 30 min. at the boil and taken out. This gives brighter dyeings than those obtained by using the same dye (0·6), K dichromate (1), and NH_4 sulphate (2) and dyeing at the boil for 1 hr. There is no difference in the fastness of the dyeings to milling, washing, perspiration, potting, and carbonising. C.O.C.

Hair-dyeing Compositions
C. G. Westerberg *USP* 2,719,104

A mixture of (1) a water-soluble thiol compound, (2) a soluble "heavy-metal" salt, and (3) an alkali is used as a hair dye. Such mixtures dye the hair from light brown to black depending on the salt or salts used and the pH at which the mixture is applied. Thus by using a mixture of Bi and Ni salts any minute variation may be obtained between the bright yellow obtained with the Bi alone and the deep brown obtained with the Ni alone. C.O.C.

Dyeing and Printing Polyacrylonitrile Fibres with Oxazine Dyes
Ciba *BP* 751,150

Oxazine dyes, which contain at least one amino group *para* to the *N* atom of the oxazine ring, and no sulpho groups, and in which each pair of the four C atoms of the oxazine ring also forms part of a six-membered aromatic ring, are very useful for dyeing and printing polyacrylonitrile fibres. Thus the dye—



applied from an acetic-acid bath yields violet dyeings of good fastness to alkalis, acids, washing, and milling and of very good fastness to light. C.O.C.

Treating Cloth with Aqueous Suspensions of Pigments
Ciba *BP* 750,150

An acid-reacting aqueous pigment suspension containing only one liquid phase and little thickening or film-forming substance when impregnated into or printed on cloth has no tendency to migrate during drying. Dyeings or prints so made are treated with an agent which fixes the pigment by adhesive action, e.g. a hardenable aminoplast, or in the case of vat dyes fixation is brought about by reducing and reoxidising the dye. C.O.C.

Hair Dyeing
Indola *BP* 749,045

Aromatic diamines, aminophenols, and their derivatives and nitro compounds, which produce fast dyeings on hair, are dissolved in molten anhydrous water-insoluble material. Hair moistened with a dilute solution containing an oxidising agent is readily dyed by treatment with the solidified material. Thus *p*-tolylenediamine (3) is dissolved in the molten condensate (97) from palm-kernel fatty acid and monoethanolamine. The molten resin is cooled and cut into sticks. Hair moistened with 3% hydrogen peroxide and then treated with the sticks develops a fast deep brown colour in 15–25 min.
C.O.C.

Automatic Temperature Regulation in Wool Dyeing (I p. 442)
Centenary of the Discovery of One of the First Synthetic Dyes (IV p. 445)
Spectroscopic Studies on Dyes. I— Association of Indigo Dyes in the Solid Phase (IV p. 449)
Effects of Changes in the Structure of Cotton Cellulose upon the Qualities of Cotton Products (VI p. 454)
Staining of Wool by Bacterial Pigments (VI p. 455)
Structure of Macromolecular Substances. XIII— Interaction of Acids with Polyamide Fibres (VI p. 456)
Influence of Temperature and Humidity on Fading (XIV p. 468)

IX—PRINTING

Behaviour of Ink and Paper during Printing
G. Martin

Papeterie, **77**, 601 *et seq.* (1955):
Chem. Abs., **50**, 7456 (25 May 1956)

An extensive résumé, including— general discussion on porosity and penetration, surface properties of paper, sizing and its effects on the absorption of liquids, surface coatings and their effect on printing, particle separation from inks by liquid penetration into paper, printing on letter and offset presses, distribution and transference of ink, rheological properties of inks, quick-, heat-, steam-, and cold-set inks used in rotary letterpresses, photogravure inks, and inks, e.g. gloss inks and dry oil-base inks, used when sheets are fed into letterpresses. Printing inks usually dry in three stages. At first, except for cold-set inks, penetration occurs. This is a filtration process that separates the macromolecules that remain on the fibre surface from the absorbed liquid vehicle. Then

gelling occurs (as with quick-set or gloss inks), which may be accelerated by heat (e.g. heat-set and photogravure inks) or by steam. Finally complete solidification occurs with the liquid removed completely either by diffusion into the paper (as with quick-set, some heat-set, and photogravure inks), by evaporation, or by oxidation (e.g. drying-oil and gloss inks). When this last stage has occurred, no further ink flow is possible and maximum adhesion has been developed. In the first stage the properties of the paper are very important. Ideal paper should be coated, contain mineral pigments, have high tear resistance, and contain extremely fine pores which will permit rapid penetration. C.O.C.

Investigations in Colour Development

XIII— Oxygen Oxidation of a Colour Developer in Presence of a Non-diffusing Colour Former

K. Meyer and L. Roth

Z. wiss. Phot., 50, 57–63 (1955)

Oxygen oxidation of a colour developer containing *p*-diethylaminoaniline (I) as developer and 3-heptadecyl-1-(4-phenoxy-3-sulphophenyl)-5-pyrazolone (II) as colour former proceeds predominantly by oxidation of sulphite, the ratio of I oxidised to sulphite consumed being 1 : 11–13. When the traces of Cu present are sequestered with Trilon B, then I is oxidised preferentially, and direct oxidation of sulphite is largely or completely prevented. II retards oxidation of I by removing the oxidation-accelerating oxidation product.

XIV— Adsorption of Colour Developers by Gelatin

W. Bure and I. Lange

Ibid., 63–78;
Chem. Abs., 50, 7633 (10 June 1956)

The amount of I taken up by the gelatin of several colour and black-and-white films was determined as a function of concentration, time of immersion, alkalinity, presence of colour formers, and condition of preswelling of the film. The amount of I taken up increased with increase in concn. of I and K_2CO_3. Presence of a coupler had little effect. Variations of temperature from 15° to 23°C. had no effect. Take-up of I started rapidly, and then continued at a decreased rate, but in most cases did not reach equilibrium in 1 hr. Presoaking the gelatin layer in water markedly increased the amount of I taken up in a given time. The dependence of amount adsorbed on concn. followed the Langmuir isotherm for a particular time of immersion of the film in the I solution. C.O.C.

PATENTS

Silk-screen Printing Frames

D. M. Johnson *BP* 749,158

The lacquered fabric-engaging face of the screen is given a roughened surface outside the patterned area. When the roughened portion of the screen is placed on top of a pattern immediately after it has been printed, the dye does not adhere to the roughened portion, and printing can therefore be carried out at successive printing positions with resultant saving in time and labour. C.O.C.

Patterned Fabrics

C. Bener *BP* 748,889

Patterned fabrics of cellulose or cellulose-derivative fibres, which contain a transparent or translucent fabric foundation and opaque portions which shrink more than the foundation when treated with shrinking agents, are given increased contrast between the two portions if the fabrics are shrunk, kept under tension while being dried, and then pressed so as wholly or partly to counteract the shrinkage and completely to remove the crinkled effect. Thus cotton muslin is printed with TiO_2 (200 g.), alcohol (200), diethylene glycol (60), and celluloid dissolved in an organic solvent (540), and then heated for 12 sec. in 52° Bé. H_2SO_4 at 0°C. The fabric is immediately washed free from acid, treated with 32°Bé. NaOH for 3 min. at 15°C. in absence of tension, washed, neutralised, stretched flat, dried under tension, with or without beating, and pressed. This imparts an intense contrasting white pattern on a transparent background. C.O.C.

Heat-resistant Raised Patterns on Textile Fabric

S. Ordan *BP* 749,355

A thermosetting paste, e.g. Vinatex Paste No. F.S. 778/Natural (Vinatex Ltd.), which on curing gives a heat-resistant product, is screen-printed on the fabric. C.O.C.

Emulsifiers for Use in Printing Pastes

FBy *BP* 749,674

Larger amounts of an emulsifier or protective colloid can be used in printing pastes if it contains one or more reactive groups (i.e. OH, COOH, NH_2, and NH) and can be rendered insoluble upon printing either by decomposition or by treatment with a compound containing $\geqslant 1$ group capable of reacting with a reactive group in the emulsifier. Thus butyl acrylate (1000) is mixed with butanol (1000), and polymerised at 100°C. in presence of benzoyl peroxide (0·5%). The polymer is refluxed in a 50% soln. of 680 parts of 1-amino-3-methylaminopropane until a sample dissolves in excess of dil. acetic acid to yield a 40% viscous soln. This soln. (100), styrene (20), and acrylonitrile are polymerised at 80°C. in presence of water (60) and K persulphate (0·4). Cotton cloth is printed with a paste made up of this emulsion (200), a 50% slurry of Cu phthalocyanine (150), hexahydro-1:3:5-triacrylyl-*s*-triazine, 65 : 1000 tragacanth thickening (350), and water (293). The printed cloth is baked at 110°C. for 15 min. This yields a blue print fast to washing and boiling. C.O.C.

Discharge Printing on Terylene

ICI *BP* 748,895

When Terylene or other polyester is padded with a dispersion of a dischargeable dye, dried, printed with a discharge paste, and steamed, preferably under super-atmospheric pressure, the dye is fixed only where there is no discharge paste. C.O.C.

Printing Designs in Colour Multiples

Société des Procédés Serge Beaune *BP* 751,358

Currency paper or the like is multicolour-printed by applying the colours in several steps but using at least two colours in each step. This is done by use of engraved copper plates, each plate having several inks, one a primary colour and the others derived or weaker colours, each ink being applied to a different part of the design. Surplus ink is wiped off the plate without causing any mixing of the inks. Such inked plates yield prints in which each line of the design has its own separate colour. C.O.C.

Colour Photography

DuP *BP* 749,225

p-Hydroxybenzaldehyde polyvinyl acetals are excellent protective colloids for silver halide grains. Aqueous silver halide emulsions made by use of such colloids can be ripened to desired grain-size distribution, split into portions, and each portion mixed with a polyvinyl acetal colour-former. Two or more such portions are then mixed with sensitising dyes and other assistants to produce compositions suitable for coating as co-operative layers on film or paper. The silver grain-size distribution and history of treatment of the resulting layers is essentially the same, thus producing good sensitometric balance in the multilayer colour-photographic product. C.O.C.

Colour Photography

Kodak *BP* 751,186

Preventing Colour Staining or Fog in Colour Photography

Kodak *BP* 751,912
BP 752,146–8

Diazotype Compositions containing Alumina

General Aniline *BP* 751,111

Dispersing alumina in the composition greatly improves image density. C.O.C.

Diazotype Material

General Aniline *BP* 752,000

If the base material is precoated with 1–3 parts of alumina of particle size $\not> 10\,\mu$. to 1 part of a film-forming lyophilic basic or amphoteric nitrogenous binder and dried

before the diazotype coating is put on, then the resulting material gives prints of markedly superior image density.
BP 752,002

If alumina is dispersed in a binder formed by a nitrogen-free water-soluble to water-dispersible starch or a water-soluble polymer of a compound containing the CH_2:CH or CH_2:C(CH_3) group, then the sensitising solution can also be added to the dispersion, and so use of a double coating process can be avoided.
BP 752,004

The single coating used contains a polyvinyl ester as the binder, alumina, and the light-sensitive diazotype materials. C.O.C.

Diazotype Materials for Black-line Images containing Diresorcyl Sulphide or Sulphoxide instead of Resorcinol
General Aniline *USP* 2,717,832

Replacement of the resorcinol in whole or in part by diresorcyl sulphide or sulphoxide yields a diazotype material which can be stored for long periods without any tendency for diffusion into the fibrous base. C.O.C.

Diazotype Processes
Ozalid Co. *BP* 751,861

The diazo and the coupling components are coated on separate base materials, the coupling component being an aromatic hydroxy compound containing no amino group which can induce coupling or a compound containing an active methylene group. Thus the diazo component may be the $ZnCl_2$ salt of *NN*-diethylaminobenzenediazonium chloride and the coupling component may be phloroglucinol or indane-1:3-dione. The material coated with the diazo component is exposed to light and then pressed against the material coated with the coupling component, transfer of the coupling component to the diazo component being induced e.g. by heating. C.O.C.

Transfers for Rubber or other Deformable Material
A. Forti *BP* 751,132

The pattern is printed by a cylinder machine in one or more colours on paper which has been either metallised or given a gelatin coating. Two or more layers of rubber solution are then applied, at least two coatings of rubber solution to form a background layer and one or more lower backing layers for the transfers. The rubber solution used is coloured, if desired, each coating being a different colour. This yields a transfer which can be applied directly to rubber in a single operation without use of other materials. C.O.C.

Pressure-rupturable Record Member
National Cash Register Co. *BP* 750,972

The material on which the record is to be made is coated with a mixture of microscopic, pressure-rupturable, oil-containing capsules of gelled hydrophilic colloid material and a solid. Each capsule contains a substance which when liberated by breakage of the capsule forms a colour with the solid. Thus the solid may be attapulgite and the colour-forming material 3:3-bis(*p*-dimethylaminophenyl)-6-dimethylaminophthalide. C.O.C.

Screen Printing of Hose (I p. 443)
Diazo Coupling Components for Use in Diazotype Material (IV p. 450)
Dyeing and Printing Polyacrylonitrile Fibres with Oxazine Dyes (VIII p. 459)
Treating Cloth with Aqueous Suspensions of Pigments (VIII p. 459)
Uses of Bentonite in the Textile Industry (X p. 462)

X—SIZING AND FINISHING

Friction between Single Fibres before and after Oxidative Treatment
E. Alexander, M. Lewin, and M. Shiloh
Bull. Research Council Israel, **5 C**, 28–34 (1955): *Chem. Abs.*, **50**, 8212 (10 June 1956)

After treatment with bromate soln. the coefficients of friction of wool and human hair all increase, but there is no significant change in the differential frictional effect.
C.O.C.

Theory of Drying of Sheet Materials by using Heated Cylinders
A. H. Nissan
Chem. and Ind., 198–211 (7 April 1956)

A mathematical treatment of the effects produced when wet sheets are passed over heated cylinders and in contact with a felt. The theoretical treatment is applied to data from a Fourdrinier newsprint machine, and yields reasonable values. A.J.

Influence of Moisture Sorption and Other Pretreatments on the Acetylation of Cotton with Acetic Anhydride and Pyridine
F. A. Blouin, R. E. Reeves, and C. L. Hoffpauir
Text. Research J., **26**, 272–275 (April 1956)

A study of the acetic anhydride–pyridine method for acetylation of cotton has shown that the degree of acetylation obtained under given conditions depends not only on the regain of the sample but also on its previous regain history. Fibres which are desorbing moisture are markedly more reactive than those of the same regain which are absorbing moisture. Long pretreatment with pyridine increases the reactivity of cotton which is absorbing moisture, and tends to minimise differences due to previous regain history. A number of other pretreatments which increase reactivity were investigated; only those reagents which penetrate the crystalline regions of the fibre were found to produce reactivity greater than that produced by high moisture contents. Increased reactivity produced by strong aqueous alkali is only partially lost after drying and resoaking in water. J.C.F.

Effect of Partial Acetylation on the Pore-size Distribution of Cotton Fabrics
E. Honold, R. E. Boucher, and E. L. Skau
Text. Research J., **26**, 263–271 (April 1956)

The pore-size distributions of the void volumes within the fabric boundaries were determined by the dilatometric mercury-intrusion method on a series of cotton sheetings whose acetyl contents ranged from 0 to 28·2%. As the acetyl content of the sheeting samples increased, there was a general downward trend in total void volume within the interfibre region. Further analysis of the interfibre void volumes by pore-size distribution curves showed a shift of the whole curve towards a smaller-pore-radius position as acetylation increased up to 14·6%. At higher acetyl contents the predominant pore size remained approximately the same, but there was a diminution in volume at each pore-radius position throughout the greater portion of the interfibre and interyarn pore-size ranges. Two additional fabrics were analysed. These were of similar construction, the one woven from yarns spun from untreated cotton, the other from yarns spun from the same cotton acetylated in fibre form to 17·4% acetyl content. The shift in peak pore size from the unacetylated to the acetylated fabric was in the same direction and of the same order as that for the two comparable members of the first series of fabrics. J.C.F.

Topochemical Examination of the Saponification of Acetylated Cotton
M. Zilahi and L. Oswald
Faserforsch. und Textiltech., **7**, 262–268 (June 1956)

Studies of sections and changes in moisture regain and insulation resistance show that the alkaline saponification of acetylated cotton begins at the surface of the single fibre and proceeds in an annular manner to the core.
W.R.M.

Measurement of the Extent of Delustring of Filament Fabrics. III—Reflection of Polarised Light
R. Jeffries
J. Textile Inst., **47**, T 319–T 328 (June 1956)

The reflection of plane-polarised light by filament yarns and fabrics, and the effect of delustring on the depolarisation, are described and discussed. Depolarisation characteristics are interpreted by dividing the total reflection into the regular reflection (upper surface and internal), the irregular reflection, and the delustre-scattered reflection, the depolarisation of each being

considered in terms of polarised and depolarised components. The use of polarised light increases the sensitivity of this method for measuring delustre.
J.W.B.

Uses of Bentonite in the Textile Industry
S. Rusznák, L. G. Bercsényi, and E. Darás
Textil Praxis, 11, 487–490 (May 1956)

Bentonite is a naturally occurring product containing aluminium cpd. and is used in sizes together with pectin, as a thickener in textile printing, for kier-boiling cotton, and for filters in the laundry industry and in the scouring of textiles.
B.K.

Condensates for Resin Finishing
H. Sobue, K. Murakami, and Y. T. Chi

XIV—Relationship between Resin Concentration and the Time of Perfect Resin Formation
J. Soc. Textile Cellulose Ind. Japan, 12, 347–353 (May 1956)

The method of measuring the point of perfect resin formation is the direct resin-hardening method of the authors. Precondensate and uncondensed resin in the bath were compared with each other. In curing in absence of a catalyst, fabrics treated in the latter bath are resinified more rapidly than those in the former bath, independently of resin concentration; in curing in presence of a catalyst, this phenomenon is completely reversed. Even with addition of a catalyst, the time of perfect resin formation cannot be shortened beyond a certain limit.

XV—Relationship between Curing Temperature and the Time of Perfect Resin Formation
Ibid., 353–356

The rate of "abridgement" of perfect resin formation is slow up to about 140°C., but above 150°C. the velocity increases. With no catalyst, uncondensed resin hardens more rapidly than precondensate, independently of curing temperature; with catalyst added, this phenomenon is reversed.
AUTHORS

Crease-resistant Finish with Urea–Formaldehyde Resin. VII—Catalysts for the Urea–Formaldehyde Precondensate Solution
M. Hida
J. Soc. Textile Cellulose Ind. Japan, 12, 341–346 (May 1956)

The effects of the catalyst on the change in pH of urea–formaldehyde precondensate solution caused by heating, on the washing fastness of the resin, and on the crease-resistance of the treated fabric were studied. According to the effect on the change in pH, the catalysts are classified into four types— (i) With this type of catalyst the pH of the precondensate solution rises markedly with the time of heating. Hydrochloric acid belongs to this type. It decomposes dimethylolurea and ammonium chloride is formed on heating. The above pH change is due to this reaction. For this reason, when hydrochloric acid is employed as catalyst, the crease-resistant finish has an inferior washing fastness owing to the retardation of the hardening of the resin. (ii) This type of catalyst causes the pH of the solution to fall on heating. The latent catalysts, e.g. picoline-monochloroacetic acid, belong to this type. Catalysts of this type have a good effect on the hardening of the resin, so they give good crease-resistance of excellent washing fastness to the fabric. (iii) This type of catalyst, e.g. $AlCl_3$, is intermediate between types (i) and (ii). (iv) With this type of catalyst, the pH of the solution falls, but after passing through a minimum value it rises rapidly. Ammonium salts of inorganic acids belong to this type. In aq. soln. the ammonium salts hydrolyse, and dimethylolurea is decomposed to urea and formaldehyde. The ammonium hydroxide and formaldehyde thus formed react immediately, and inorganic acid is liberated. As the acid concn. is steadily increased by this reaction, dimethylolurea is decomposed and the pH of the solution rises rapidly. For these reasons, the excellent latent catalyst and the ammonium salts of inorganic acids have optimum amounts to be employed in the solution of dimethylolurea. The effect of the catalyst on the crease-resistance of the treated fabric is not marked.
AUTHOR

Crease-resisting of Viscose Rayon—Advantages of Tri- and Hexa-methylolmelamines over Dimethylolurea
F. Kocevar and B. Pregrad
Rayonne, 12, 513–530 (April 1956)

Various factors affecting the results obtained in crease-resisting viscose rayon are discussed with regard to their influence on angle of crease, shear resistance, etc., including the effects of temp. and time of curing of tri- and hexamethylolmelamines, and of various catalysts and plasticisers.
B.K.

Decomposition of Jute and Cellulose by Aerobic Bacteria
S. N. Basu and R. G. Bose

I—Influence of Environmental Conditions and Associated Substances
J. Textile Inst., 47, T 329–T 342 (June 1956)

The decomposition of jute and cellulose by aerobic bacteria, using third-generation cultures from composted soil, is studied. It is rapid under aerobic conditions only when the fibre is actually wet, the mean optimum temperature and pH being 37°C. and near neutral respectively. Leaching jute in hot water enhances resistance owing to removal of micronutrients. Lignin is the most resistant constituent of jute and also offers some protection to the cellulosic fraction. Hemicellulose is the most assimilable major fraction of jute and, if present, leads to increased consumption of α-cellulose. About 25% of the xylan is as resistant as the α-cellulose, jute α-cellulose also occupying an intermediate position between cotton α-cellulose and filter paper. Decomposition of cellulose is favoured by an increase in surface and in amorphous content, and by decrease in molecular chain length.

II—Effects of Modification by External Agencies
Ibid., T 343–T 347

When jute is treated with acids and alkalis, and exposed to heat and light, resistance to aerobic bacteria is in all instances increased. The physical agencies probably lead to toxic decomposition products, apparently from the non-cellulosic portion. Chemical treatment probably removes some micronutrients and possibly macronutrients.
J.W.B.

Effect of Quaternary Treatment under Varied Ratios of Weight–Volume–Concentration on the Bacteriostatic Property of Fabrics
M. T. Goldsmith, M. A. Latlief, J. L. Friedl, and L. S. Stuart
Appl. Microbiol., 4, 91–94 (1956)

Cross-linking of Wool Keratin
J. E. Moore and W. H. Ward
J. Amer. Chem. Soc., 78, 2414–2418 (5 June 1956)

NN'-Bismaleimides, e.g. *NN'-m*-phenylenebismaleimide, are cross-linking agents for reduced wool.
C.O.C.

PATENTS

Fugitive Tinting, especially of Cellulose Esters or Ethers
BrC *BP* 749,683

A direct cotton dye is used together with a water-soluble synthetic polymer containing recurrent N atoms directly attached to CO groups, e.g. an addition polymer of an *N*-vinylsuccinimide, to give a tint which is readily removed by a mild soap scour.
C.O.C.

Crease-resistant Finish
Linen Industry Research Assocn. *BP* 750,002–3

Modification of *BP* 618,813 and *BP* 638,593 (J.S.D.C., 66, 500 (Sept. 1950)), insolubilisation of the resin being obtained with much less loss of strength and durability by treating with saturated steam at 100°C. instead of baking in air. The steam must contain formaldehyde vapour and the moisture content of the cloth must not exceed 15% during steaming.
C.O.C.

Improving the Dimensional Stability of Cellulose-derivative Knitted Fabrics
Celanese Corpn. of America *BP* 749,132

Wet knitted fabric of cellulose acetate or other organic ester of cellulose is heated in a gaseous atmosphere,

preferably of steam, while held to a definite width and supported across its whole width and at frequent intervals or continuously along its length. It is kept at high temperature until the fibres are swollen and internal stresses in the yarns are relaxed but without causing the yarns to fuse or coalesce with one another. During the treatment the moisture content of the fibres should not fall below its saturation regain value. Finally the fabric is cooled and dried. C.O.C.

Rotproofing of Cellulose or Regenerated Cellulose
S *BP* 749,324

The fibres are impregnated with the condensate of cyanamide and polyethylenepolyamine or a derivative of such condensate and with a bactericidal or fungicidal phenol either separately or in the same bath. C.O.C.

Rotproofing Cellulosic Materials
Dux Chemical Solutions Co. *BP* 750,183

The materials are first impregnated with ammonium naphthenate and then treated with cuprammonium hydroxide. The finished cloth appears like that produced by the normal cuprammonium process but is somewhat more flexible and more resistant to the copper being leached out by water. C.O.C.

Rot- and Mildew-proofing of Textiles
ICI *BP* 750,501

Treatment with a hydroxydiarylmethane, a hydroxytriarylmethane, or a halogenated derivative thereof in which the halogen atoms are attached either directly to an aryl nucleus or to the methane C atom, and with a compound of formula—

$$A^1{\cdot}NH{\cdot}\overset{NH}{\overset{\|}{C}}{\cdot}NH{\cdot}\overset{NH}{\overset{\|}{C}}{\cdot}NH{\cdot}[CH_2]_n{\cdot}NH{\cdot}\overset{NH}{\overset{\|}{C}}{\cdot}NH{\cdot}\overset{NH}{\overset{\|}{C}}{\cdot}NH{\cdot}A^2$$

(A^1 and A^2 = same or different phenyl substituted by Alk, Alk·O, NO_2, or Hal; n = 3–9; the polymethylene chain may be interrupted by O atoms and/or an aromatic nucleus), simultaneously or in either order, gives excellent rotproof finish which is resistant to leaching and which is not discoloured by exposure to light. Thus the material may be impregnated with 2:2′-dihydroxy-5:5′-dichlorodiphenylmethane and hexamethylenebis-(*p*-chlorophenyl)-diguanide dihydrochloride. C.O.C.

Flame-resisting Finish
Chicopee Manufacturing Corpn. *BP* 750,262

Incorporation of dicyandiamide into fabrics containing ammonium sulphamate as a flame retarder stabilises the sulphamate and prevents loss in tensile strength and in appearance. C.O.C.

Modifying Wool with β-Propiolactone
U.S. Secretary of Agriculture *USP* 2,717,194

The reaction between wool and β-propiolactone (described in *USP* 2,672,397 (J.S.D.C., **71**, 371 (1955))) is enhanced by the presence of aliphatic alcohols of > 7 C, the absorption of β-propiolactone being 30–40% greater than when treatment is in presence of a solvent, e.g. CCl_4, and the reaction time being the same. C.O.C.

Hair-waving Composition
Gilette Co. *USP* 2,717,228

Addition of urea or a monoalkyl derivative thereof to a thiol greatly improves the efficiency of the thiol, so that plasticisation of the hair may be markedly speeded up, either without increase in the amount of thiol used or of the alkali or the thiol and/or the pH may be reduced and adequate plasticisation achieved in the same or a shorter period. C.O.C.

Setting Regenerated Protein, Polyester, Nylon, or Polyacrylic Yarns and Tubular-knit Fabrics
Adshead & Geeson *BP* 750,526–9

The yarn or fabric is passed continuously or intermittently through steam (which may be superheated or not according to the temperature and the amount of moisture desired to obtain extensibility of the material), then through hot, preferably dry, air, and then over and touching a surface at ≮ 300°F. C.O.C.

Finishing Cloth, Films, etc. consisting wholly or mainly of Synthetic or Thermoplastic Material
Cilander AG. *BP* 748,964

High glaze is obtained by giving a mechanical finish, if necessary under the action of heat and pressure, and then treating at any subsequent stage with a swelling agent so as to produce at most shrinking of the synthetic or thermoplastic material without weakening it. Thus heat-set nylon muslin is calendered twice at 140°C. and then treated with 10% aq. HCl for 15 sec. at 60°C. This imparts high glaze and a beautiful, non-waxy, silky appearance. C.O.C.

Organic Metallic Compounds—Water- and Rotproofing Agents
Ions Exchange & Chemical Corpn. *BP* 748,283

A polymeric material containing at least one OH group, e.g. cotton or regenerated cellulose, is treated with an aqueous solution of a water-soluble salt of a metal, at a temperature and for a time sufficient to convert the material into a solid alkoxide of the metal. Thus regenerated cellulose sheeting is treated in 1% aq. titanium sulphate in presence of 1% aq. Na_2CO_3 for 30 min. at 80°C. The sheeting then consists of a titanium alkoxide. C.O.C.

Coating Fabric with Synthetic Rubber Latices
DuP *USP* 2,717,217

The dry compounding ingredients and the oily compounding ingredients are formed into an aqueous slurry and an emulsion respectively and are then both mixed with a synthetic rubber latex and other necessary ingredients to form a coating composition of viscosity too low to be applied by a doctor. This composition is simultaneously concentrated and deaerated by exposing a thin film of it to hot moving air until it has viscosity of 6,000–16,000 centipoises and is free from occluded air. It is applied to fabric by a doctor, heated to evaporate volatile components and produce a dense, bubble-free coating, which is further heated to cure it. C.O.C.

Bonding Textiles to Rubber
United States Rubber Co. *BP* 751,195

If resorcinol and paraformaldehyde, both in the dry state, are applied to the textile and/or the rubber, or one to the textile and the other to the rubber, before bringing the textile and the rubber together, then on joining them and heating to cause the resorcinol to react with the paraformaldehyde, an unprecedentedly firm bond is formed between the textile and the rubber. C.O.C.

Coating Textiles and other Materials with Metal
H. Schladitz *BP* 749,302

The material is heated and metal compound is supplied to it in constant rapid alternation. The heat is such that the metal compound is decomposed. The metal compounds used are those, e.g. the carbonyls, which decompose to yield the metal at 100°C. or lower. C.O.C.

Bonded-yarn Fabric
E. Bobkowicz *BP* 749,914

One set of yarns is placed across another set so that by pressing them together the yarns in one set penetrate into the interstices between the yarns of the other set, the whole being then welded together by a heat-activated bonding agent. C.O.C.

Composite or Multi-ply Fabric
O. G. J. S. De Roysancour *BP* 750,189

At least one layer of cloth having impressed in it a large number of cavities which have been fixed by impregnating the fabric with a stiffening agent is bonded to a similarly impregnated fabric so as to close the cavities and form air-retaining cells between the two layers. C.O.C.

Composite Rubber–Textile Materials resistant to Attack by Micro-organisms
Dunlop Rubber Co. *BP* 750,513

Incorporation into the rubber of an acyl-substituted phenol or its halogenated derivative, e.g. *o*-phenyl-*o*′-

chlorophenol, renders the textile material with which the rubber is united resistant to attack by micro-organisms.
C.O.C.

Effects of Changes in the Structure of Cotton Cellulose upon the Qualities of Cotton Products (VI p. 454)
Heat Deterioration of Tyre Cords (VI p. 456)
Leather Substitute from Synthetic-polymer Fibres (XIII p. 466)

XI—PAPER AND OTHER CELLULOSIC PRODUCTS

Ion Exchange on Cellulose and its Derivatives
V. I. Ivanov and N. Ya. Lenshina
Izvestiya Akad. Nauk S.S.S.R., Otdel. khim. nauk, 506–508 (April 1956)

The ion-exchange properties of cotton cellulose (COOH content 1·5 mg.equiv. per 100 g.) and oxidised celluloses (COOH contents ranging up to 280 mg.equiv. per 100 g.) are examined for 0·005 M. soln. of $NiCl_2$ and $FeCl_3$ at pH 6·6 and 1·4 respectively. Exchange with Ni^{2+} is to be attributed to the presence of COOH groups in the cellulose, for the preparations absorb Ni^{2+} in amounts equiv. to their COOH contents. Ferric ions, however, are absorbed by a different mechanism, the capacity of the preparations for Fe^{3+} ($\sim$ 50 mg.equiv. per 100 g.) being almost independent of COOH content. A.E.S.

Electron-microscopic Investigation of the Viscose Process—I and II
B. G. Rånby, H. W. Giertz, and E. Treiber
Svensk Papperstidning, **59**, 117–127 (29 Feb.) and 205–217 (31 March 1956)

I—The fine structures of native cellulose and of cellulose regenerated from the successive stages of the viscose process have been examined electron-microscopically with particular reference to the fibrillation of the regenerated cellulose, i.e. whether it is derived from the native cellulose or formed during the regeneration of the cellulose and the stretching of the fibres, and the extent to which cellulose xanthate is dissolved molecularly in technical viscose solution. 35 references.

II—Examination of the electron micrographs shows that the native fibre structure is largely preserved in alkali cellulose and fibre xanthate in spite of the high swelling. Degradation during ageing produces an increase in short, thin fragments of the native elementary fibrils. The dissolution of xanthate to viscose causes a severe but incomplete disordering of the native morphology. Fragments are formed to a somewhat greater extent in less reactive pulps, such as prehydrolysed sulphate, linters, and paper pulp, and the filtration difficulties increase in the same order. Besides lamellae, thin fibrils are found in regenerated cellulose from cotton-linters viscose. When viscose is diluted the native fragments and micelle aggregates disappear gradually, and the regenerated cellulose from a viscose with $< 1\%$ cellulose contains practically only a disordered spongy gel. It is not thought that the solution is characterised by a more or less homogeneous particle size: there exists most likely a whole dispersion spectrum in technical viscose, but it is improbable that the maximum of the dispersion curve would be at single molecules. The state of solution seems probably to be one of molecular aggregates, micelles, and micelle aggregates. K.W.

Some Xanthate Methyl Esters of Glucose
A. K. Sanyal and C. B. Purves
Canadian J. Chem., **34**, 426–435 (April 1956)

Cellulose Analysis and Bleaching Methods for Cellulosic Materials. VIII—Degrees of Bleaching of Unbleached Sulphite and Kraft Pulps
S. Honda, K. Hagiwara, and M. Okabe
J. Soc. Textile Cellulose Ind. Japan, **12**, 322–327 (May 1956)

Chlorination of the unbleached pulps always requires two or three stages. AUTHORS

Brightness and Whiteness—Two Properties that are often confused
A. S. Stenius
Svensk Papperstidning, **59**, 172–174 (15 March 1956)

The physical difference between the brightness of pulp and the whiteness of paper and the relationship between these two properties are discussed in order to stress the need for two different terms to be introduced in the Swedish terminology. K.W.

Baysikal K (FBy) and other Calcium Silicates as Fillers for Paper
E. Podschuss and C. Klein
Das Papier, **9**, 484–487 (1955): *Chem. Abs.*, **50**, 7456 (25 May 1956)

Baysikal K (FBy) is a Ca silicate of mean particle size about 0·09 μ. It not only brightens the paper but can also be used effectively with fluorescent brightening agents because of its ultraviolet reflectance, which is higher than that of TiO_2. Its approximate composition is SiO_2 65, Al_2O_3 0·4, CaO 16, Na_2O 2, CO_2 5, H_2O 11, and NaCl 1%; its n is 1·5, sp.gr. 2·2, and pH 10. Its use and that of other Ca silicates, including the American Silene, are discussed.
C.O.C.

Increasing the Whiteness and the Opacity of Paper with Zirconia
J. Frasch
Compt. rend. 27 Cngr. intern. Chim. ind. (Bruxelles), (3) (1954): *Industrie chim. belge*, **20** (Spec. No.), 380–381 (1955): *Chem. Abs.*, **50**, 7455 (25 May 1956)

Small quantities of ZrO_2 in paper markedly improve the whiteness and the opacity. Because ZrO_2 precipitated in the fibre is retained to a larger extent than is TiO_2, $< 0·1\%$ ZrO_2 (dry wt.) gives as good an effect as 2% TiO_2. ZrO_2-gelatin complexes can be used to promote retention of TiO_2. C.O.C.

Thermal Stability of Cellulose and Paper
N. Ya. Solechnik and N. E. Trukhtenkova
J. Appl. Chem. U.S.S.R., **29**, 416–424 (March 1956)

Papers and the cotton and wood celluloses from which they have been prepared are heated at 100–180°C. for 2–6 hr. The papers are subjected to tensile tests and the original celluloses to analysis for content of aldehyde groups (I.V.). The mechanical behaviours of the papers are in close correlation with the chemical characteristics of the corresponding celluloses. Cotton celluloses (average D.P. $>$ 1200; fractions of D.P. $<$ 10 absent) have the highest thermal stability, and sulphite celluloses (fractions of D.P. $>$ 1200 absent; $\sim$ 5% is of D.P. $<$ 10) the lowest; sulphate celluloses are intermediate. For optimum thermal stability a paper should yield an aq. extract of pH 6·5–7·5. As the paper becomes more acid, its thermal stability progressively diminishes; at pH $>$ 7·5 the thermal stability is good with respect to loss in strength, but the paper yellows. Adsorbed cations (Ca^{2+} and Al^{3+}) have no effect on thermal stability. A.E.S.

Chemical Changes produced in the Cellulose Macromolecule by Oxidising Agents
IX—Oxidation of Cellulose by Nitrogen Dioxide
E. D. Kaverzneva, V. I. Ivanov, A. S. Salova, and S. A. Kist'
Izvestiya Akad. Nauk S.S.S.R., Otdel. khim. nauk, 358–367 (March 1956)

Purified bleached cotton cellulose is treated with NO_2, and the products are analysed for carboxyl (total and uronic), aldehyde, ketone, hydroxy-ketone, carbonic ester, and nitric ester groupings. Refinements in analytical methods enable errors in previous work (e.g. Kenyon's) to be avoided. The action of NO_2 is not confined to the oxidation of primary alcohol groups, although most of the COOH groups formed are in the 6-positions of the glucose residues; COOH groups are formed also by rupture of the pyran ring. Carbonyl groups are also found (e.g. 19 CO groups per 100 glucose residues under conditions that give 65 COOH groups per 100 glucose residues). In freshly oxidised preparations most of the carbonyls are ketone groups and the content of aldehyde groups is low ($\ngtr$ 0·3

per 100 glucose residues). No peroxy and carbonic ester groupings are present. In the course of the oxidation the nitrogen content at first increases and then diminishes; all of the nitrogen is present in the form of nitric ester groupings. The results support Kenyon's suggestion (*J. Amer. Chem. Soc.*, **69**, 355 (1947)) that oxidation proceeds via the formation of nitric ester groupings and their subsequent oxidative hydrolysis, but this process occurs not only at primary, but also at secondary, OH groups.

X—Oxidation of Hydroxy Compounds of Low Molecular Weight by Nitrogen Dioxide
E. D. Kaverzneva, V. I. Ivanov, and A. S. Salova
Ibid., 482–490 (April 1956)

*iso*Propyl alcohol, ethylene glycol, propane-1:2-diol, and methyl α-glucoside are treated in the cold with half of the amount of NO_2 required for complete oxidation. *iso*-Propyl alcohol gives some acetone, and propane-1:2-diol gives hydroxyacetone and pyruvic acid, but no lactic acid, which shows that the secondary alcohol group is preferentially oxidised. In methyl α-glucoside both primary and secondary alcohol groups are oxidised. In the case of the mono- and di-hydroxy cpd., substances that behave as nitric esters can be extracted by CCl_4 from the oxidation products. This fact is considered to support the view that in these oxidations, and hence in the oxidation of cellulose, reaction proceeds via nitric esters. A.E.S.

Influence of Fibre Structure on the Nitration of Native Cellulose
B. Miller and T. E. Timell
Text. Research J., **26**, 255–263 (April 1956)

Native cotton cellulose (D.P. ca. 1700) was nitrated under both equilibrium (4 hr., 5°c.) and rate-controlled (10–30 min., −32°c.) conditions with HNO_3–H_3PO_4–P_2O_5 mixtures known to cause no degradation of the cellulose. The nitrates obtained were fractionated by successive extractions with a series of ethanol–ethyl acetate solvent mixtures up to the point where swelling became noticeable. Nitrogen-content and viscosity determinations were made on the fractions. The results indicated that the cellulose nitrates were chemically non-uniform. Products formed under equilibrium conditions were more homogeneous than those obtained under rate-controlled conditions. A sample nitrated under equilibrium conditions showed increased homogeneity after dissolution in acetone and reprecipitation with water. It is considered that nitration involves an initial rapid but incomplete reaction of the surface and outer regions of the microfibrils followed by a slower but more complete esterification of the more highly oriented regions of the interior, after which the accessible regions slowly become more completely nitrated. J.C.F.

Hydrolysis of Cellulose Acetate Sulphate in Acetone–Water Solutions
P. E. Gagnon, K. F. Keirstead, J. Walker, and K. R. Kavanaugh
Canadian J. Technol., **34**, 71–82 (March 1956)

Measurements of rates of hydrolysis of cellulose acetate sulphate in acetone–water mixtures, by titration of the sulphuric acid liberated, show that the reaction is neither heterogeneous nor diffusion-controlled. The liberation of sulphuric acid is of the first order over the range of water concn. 0·27–1·67 M., the rate decreasing as the concn. of water is raised. Ethanol and methanol also inhibit the reaction, but benzene has no effect. Activation energy increases with increasing water content and decreasing temp. A.J.

Synthesis and Properties of Phthalic Esters of Hydroxyethylcellulose
S. N. Ushakov, O. M. Klimova, and S. G. Lyubetskii
J. Appl. Chem. U.S.S.R., **29**, 438–447 (March 1956)

Hydroxyethylcelluloses (degree of substitution 0·20, 0·45, and 1·03 hydroxyethyl groups per glucose residue; analysis by the tosylation–iodination method shows that practically all the hydroxyethoxy groups replace primary OH groups of the original cellulose) and mercerised cotton linters are phthaloylated with phthalic anhydride in pyridine or dioxan. The effect of variation in reaction conditions is studied. It is shown that reaction occurs predominantly at primary OH groups. Some of the phthalic acid is present as diester and some as acid mono-ester. The products are more stable to heat than the corresponding cellulose esters, and their stability increases as the hydroxyethyl content of the starting material increases. They are sol. in dioxan, pyridine, 4 : 1 acetone–water, and 0·1N-NaOH; some of them are sol. also in other solvents. Such products are of interest because of their good solubility and the possibility of converting them into three-dimensional polymeric products by treatment with di- and tri-hydric alcohols. A.E.S.

PATENT

Coating Composition for Paper
Minnesota & Ontario Paper Co.
USP 2,717,213

An aqueous suspension of pigment and raw starch is subjected to high shearing and centrifugal force and then treated with an amylolytic enzyme. This forms a composition yielding coatings of higher gloss, smoother surface, and better adherence to paper than those obtained by mixing a dispersion of a pigment with a dispersion of an adhesive. C.O.C.

Studies in Hydrogen-bond Formation. V—Complex-forming Properties of Esters, and their Relation to the Adsorption Properties of Cellulose Acetate and other Polymers (VIII p. 458)
Dyeing of Paper (VIII p. 459)
Behaviour of Ink and Paper during Printing (IX p. 459)
Organic Metallic Compounds—Water- and Rot-proofing Agents (X p. 463)

XII—LEATHER; FURS; OTHER PROTEIN MATERIALS

Modification of some Reactive Groups of Collagen and the Effect on the Fixation of Tervalent Chromium Salts
R. L. Sykes
J. Amer. Leather Chem. Assocn., **51**, 235–244 (May 1956)

Inactivation of collagen side-chains by acetylation and by methylation indicates that both processes may reduce the ability of collagen to combine with either anionic or cationic tervalent Cr ions. At least two types of reaction may take place, both of which result in a combination which is not reversed by exhaustive washing. One of these is the actual penetration of carboxyl radicals into the Cr ion with the formation of a co-ordination complex. Another involves attachment at other reactive centres of the collagen mol., probably by means of hydrogen bonds. Only co-ordinate bonds have the necessary directional character to bring about the enhancement of hydrothermal stability which follows interchain cross-linking (a characteristic of chrome tanning). The number and the nature of the ligands occupying co-ordination sites in the Cr complex prior to its reaction with collagen will influence the amounts of Cr bound by either of the postulated mechanisms. J.W.D.

Identification of a New Compound (Lanthionine Sulphoxide) in Products from Animal Skin
H. Zahn and D. Wegerle
Leder, **6**, 278 (1955)

PATENTS

Preserving Hides and Skins from Bacterial Damage
British Leather Manufacturers' Research Assocn.
BP 749,769

Treatment with weakly acid, neutral, or weakly alkaline aqueous solutions of stable water-soluble salts of chlorous acid, preferably alkali-metal or alkaline-earth-metal chlorites, gives good protection against bacterial attack. They can be used either alone or in brine, or can be added to the curing salt. C.O.C.

Bating
Österreichische Stickstoffwerke *BP* 751,141

Use of thioglycollic acid and/or a water-soluble salt thereof instead of an enzyme results in less loss of skin substance. C.O.C.

Tanning
Boehme Fettchemie *BP* 748,995

Polyalkyl ether derivatives of high-molecular sulphonamides have high affinity for collagen and are readily worked into hides. They are used as tanning agents, if desired simultaneously with any other tanning agent. C.O.C.

Tanning with Mineral Agents and Protein Condensates
Chemische Fabrik Grünau *BP* 748,563

The tanning liquor contains both a mineral tanning agent and (*a*) protein fatty acid condensates or (*b*) condensates obtained from degraded protein and high-mol.wt. carboxylic anhydrides and/or sulphonyl halides of the aliphatic or aliphatic-aromatic series or (*c*) ethoxy derivatives of either (*a*) or (*b*). This yields a supple leather, and if stuffing agents are incorporated in the tanning bath, stuffing of the tanned leather is unnecessary. C.O.C.

Drying Hides or Skins
British United Shoe Machinery Co. *BP* 750,416

The hide is placed between a heated rubber sheet and a porous plate, suction being then applied to the side of the plate away from the hide. This prevents shrinkage during drying. C.O.C.

XIII—RUBBER; RESINS; PLASTICS

Viscosity of Polyamide Melts
T. N. Kokhomskaya and A. B. Pakshver
Kolloid. zhur., 18, 188–192 (March–April 1956)

Viscosity (η) measurements are made at various accurately controlled temp. on melts of 6-nylon (before and after extraction treatments to remove material of low mol.wt.) and 6,6-nylon ranging in mol.wt. (M) from 2,250 to 18,040 and from 7,530 to 10,560 respectively; a range of intermediate copolymers is also examined. At the lower end of the mol.wt. range the temp. dependence of η conforms to an Arrhenius equation, and values for the activation energy for viscous flow E_η are calculated. For 6,6-nylon E_η is much greater than for 6-nylon of the same M, and it is concluded that the proportion of hydrogen bonds formed intramolecularly is less in 6,6- than in 6-nylon. At 265–275°c. for 6,6-nylon and at 245–255°c. for 6-nylon, ln η is a linear function of $M^{\frac{1}{2}}$; at higher temp. there is a slower rise of η with M, which is attributed to more pronounced coiling of the larger molecules at higher temp. Copolymerisation results in reduced η (reduced regularity of structure and reduced interaction between molecules). A.E.S.

Use of Polyamide Resins in Surface Coatings
H. W. Keenan
J. Oil & Col. Chem. Assocn., 39, 299–313 (May 1956)

The preparation, curing, and properties of polyamide resins suitable for surface coating are described. Experiments are described to show the important influence of epoxide–polyamide ratio on the chemical and physical properties of clear and pigmented films. A study of pigmentation at various epoxide–polyamide levels indicates that variations of the ratio lead to certain unforeseen effects on flexibility and impact tests, and that the temp. of curing has a significant effect also. J.W.D.

Macromolecular Compounds
XCV—Polyesters of 5:5′-Thiodivaleric Acid
V. V. Korshak and S. V. Vinogradova
J. Gen. Chem. U.S.S.R., 26, 732–735 (March 1956)

Polyesters are prepared from 5:5′-thiodivaleric acid and various $\alpha\omega$-alkanediols and other glycols, and they are characterised by determination of m.p., alcohol-solubility, and specific viscosity in benzene soln. Their m.p. are lower than those of the corresponding sebacic polyesters, and the introduction of the sulphide linkage results in the elimination of the "odd–even" effect (alternating rise and fall in m.p. as the number of C atoms in the glycol increases by one at a time).

XCVIII—Dependence of the Properties of Mixed Polyamides on the Extent of Hydrogen Bonding
V. V. Korshak and T. M. Frunze
Ibid., 1212–1216 (April 1956)

The authors' experimental work on mixed polyamides (see e.g. J.S.D.C., 71, 114, 479 (1955)) is surveyed. An explanation is advanced for the existence of a minimum m.p. on the m.p.–composition curve of two-component polyamides. A.E.S.

***NN*-Dialkylanilines as Solvents for Polyvinyl Chloride**
T. Tsuruta and J. Furukawa
Bull. Chem. Soc. Japan, 29, 439 (April 1956)

Solubility and viscosity measurements show that dimethylaniline is a better solvent for polyvinyl chloride than is diethylaniline. Aniline itself is not a solvent. W.R.M.

Hysteresis Phenomena in Polymer Solutions
S. I. Meerson and E. G. Grimm
Kolloid. zhur., 18, 199–207 (March–April 1956)

The method of preparing a soln. of a polymer often affects the apparent solubility of the polymer and the properties of the soln., e.g. viscosity, for false equilibria may be set up and may persist for a very long time. For example, certain systems consisting of a copolymer of acrylonitrile and vinylidene chloride, acetone, and benzene are obtained as homogeneous soln. when prepared by dilution of an acetone soln. with benzene, but as two-phase gel–liquid systems when prepared by addition of polymer to acetone–benzene mixtures; the systems so obtained are stable for at least one year. A similar phenomenon is observed with cellulose diacetate, but equilibrium is attained within a few weeks, so that systems identical in composition become identical in properties. Such hysteresis effects with respect to solubility and viscosity are studied for the two polymers mentioned and for cellulose dinitrate, rubber, and polystyrene in suitable solvent–non-solvent mixtures. A.E.S.

Heats of Dilution of Polyvinyl Alcohol Solution—I
K. Amaya and R. Fujishiro
Bull. Chem. Soc. Japan, 29, 361–363 (April 1956)

PATENTS

Leather Substitute
Wingfoot Corpn. *BP* 749,489

A large proportion of fibrous material is made into sheet form using rubber as the bonding agent, preferably by dispersing the fibrous material into rubber latex which has been formed into a froth, e.g. by foaming with gas, gelling the latex, and then vulcanising under pressure. C.O.C.

Leather Substitute from Synthetic-polymer Fibres
DuP *BP* 751,017

A carded lap of the fibres is treated with a thermoplastic polymeric binder of softening point less than that of the fibres and is then pressed in a sheet at a temperature between the two softening points. The pressed sheet is then treated with a liquid swelling agent for the fibres at a temperature between the two softening points, cooled, and then dried to remove the liquid. C.O.C.

Treating Silicones with Ionising Radiation
United Kingdom Atomic Energy Authority *BP* 749,680

Polymers containing long chains of alternate Si and O atoms having substituents attached to the Si atoms, when treated with ionising radiation, e.g. γ-rays, high-energy neutrons, deuterons, helium ions, protons, and electrons, develop cross-linking with consequent change in their physical properties. C.O.C.

Emulsified Ionically Cross-linked Resins as Surface Coatings, as Impregnating Agents, and for Producing Foils (V p. 454)
Bonding Textiles to Rubber (X p. 463)

XIV—ANALYSIS; TESTING; APPARATUS

Improvements in the Colorimetric Determination of Magnesium and Ammonium using Sodium Polyacrylate
A. Mehlich

J. Assocn. Off. Agric. Chem., **39**, 518–523 (May 1956)

The use of sodium polyacrylate as a stabiliser of the colour lake in the determination of magnesium with Thiazol Yellow and of ammonium with Nessler's reagent is described. It is suggested that the use of sodium polyacrylate contributes considerably to the improvement of the methods. P.G.M.

Determination of Soaps with Ion-exchange Resins
J. W. Jenkins

J. Amer. Oil Chem. Soc., **33**, 225–226 (May 1956)

A rapid method for the determination of soaps in the presence of neutral fat is given. Dowex-50 ion-exchange resin is used, the eluting agents being ethanol or an ethanol–benzene mixture. The average recovery of 13 soaps was 99·8%. P.G.M.

Characterisation of Fatty Acids through their *p*-(*p*′-Nitrophenylazo)phenacyl Esters and their Chromatographic Separation
El Sayed Amin and E. Hecker

Chem. Ber., **89**, 1496–1502 (June 1956)

Qualitative Tests for Rapid Identification of Chlorinated Hydrocarbons in Insecticide Formulations
D. P. Johnson

J. Assocn. Off. Agric. Chem., **39**, 490–497 (May 1956)

Rapid qualitative tests are described for the detection and identification of the more commonly used polychloro insecticides whether alone or in dust mixtures. Their simplicity and accuracy render these tests readily adaptable to routine use. P.G.M.

Chromatography of Coal-tar Dyes
S. Fujii

Bull. Natl. Hyg. Lab., Tokyo, (73), 335–376 (1955): *Chem. Abs.*, **50**, 7014 (25 May 1956)

Paper-chromatographic classification of 95 dyes is given. The dyes, to which have been added *C.I.* 9, 10, and 121, are chromatographically developed on filter paper. The above three dyes mark out four zones and one starting line. The dyes that settle in these zones and at the starting line are called Groups I–V respectively. Water-insoluble dyes are placed in Group VI. The dyes of each group are divided into subgroups depending on whether or not their colour is restored when they are neutralised with ammonia after being reduced with 10% $SnCl_2$ in conc. HCl. Each subgroup is further divided into those unaffected by tannic acid and those which are precipitated by it. Details are given of the methods of extracting the dyes from foodstuffs, etc. and of the procedure for obtaining the chromatograms. C.O.C.

Paper Chromatography of Reduction Products of Benzidine Dyes
S. Kitahara and H. Hiyama

J. Chem. Soc. Japan, Ind. Chem. Sectn., **58**, 620–625 (1955): *Chem. Abs.*, **50**, 7463 (25 May 1956)

The following dyes— Congo Red, Benzopurpurin 4B, Direct Blue 2B, Diamine Sky Blue, Direct Violet RN, Acetopurpurin 8B, Coupling Orange Extra, Pyramine Orange R, Toluylene Orange G, Fast Red F, Benzo Orange R, Direct Brown M, Direct Red G, Benzo Fast Red GI, Congo Orange R, Benzo Brown CB, Congo Corinth G, Brilliant Bordeaux NS, Direct Black BH, Diamineral Blue CVB, Congo Rubine, Direct Brown 3G, Direct Green G, Direct Dark Green, Congo Brown G, Direct Fast Black HW, and Deep Black Extra— were reduced with acidic stannous chloride and chromatographed using butanol–HCl (4 : 1) or 2% aq. HCl and treating the chromatogram with $FeCl_3$ or NH_4OH. The colour given and the R_f value for each reduction product are shown in tables. C.O.C.

Stability Test for Phthalocyanine Blue
R. Zeisberger

Deut. Farben-Z., **10**, 87–88 (1956): *Chem. Abs.*, **50**, 8223 (10 June 1956)

The following test for the stability of the α-form is reliable and precise— Mix 10 g. Zinc Yellow and 0·05 g. Phthalocyanine Blue in a muller. Make 1 g. of the resulting green into a suspension with 10 ml. xylene and place it in a water-bath. After 2 hr. compare with a freshly made suspension. Unstable Phthalocyanine Blue turns from green to a faded green or dirty yellow. Slight change can be ignored. C.O.C.

Comparison of Gradient and Flotation Methods for determining the Density of Degraded Cotton
J. C. Austin and J. S. Roberts

Text. Research J., **26**, 303–309 (April 1956)

The densities of a series of laundered cottons at 13 different regains were determined (*a*) by a flotation method and (*b*) by the use of density-gradient columns. Entrapped air was removed either (i) by centrifuging in organic solvents or (ii) by boiling in xylene. With an unlaundered control sample at low regains all methods gave comparable results. Variation in values appeared in the control above 3% regain and in the laundered samples at all regains. Boiling laundered samples in xylene caused a significant increase in density. It is concluded that (*a*) is the more sensitive and reliable method of determining the density of degraded cotton. J.C.F.

Semi-micro Extraction Apparatus for Determination of Fatty Matter in Cotton Fibres
F. Franks

J. Textile Inst., **47**, T 369–T 370 (June 1956)

If the column and tray method of Dickinson and Palmer is used to extract fatty matter from cotton there is some residue left which can subsequently be extracted by hot solvent. An apparatus is devised whereby 1·5 g. of fibre is extracted continuously with 15 ml. of ether. Exhaustive extraction is obtained after 15 min. reflux, after which the solvent is forced through a siphon side-tube and allowed to drop into a heated aluminium tray of known weight. 5 ml. of ether is used to rinse the flask. Good reproducibility is obtained in the region of 0·5–1·5 mg., the applicability thus being limited mainly by the accuracy in weighing. J.W.B.

Microtechnique for the Preparation of Longitudinal Sections of Wool Fibres
R. Lassé

Textil-Rund., **11**, 323–328 (June 1956)

A discussion of the technique with comparisons drawn between the information afforded by longitudinal sections and cross-sections, and between what are termed "true" and "optical" sections. S.R.C.

Identification of Wool Damage by Tensile Strength and Extension Tests
E. Schumann

Textil Praxis, **11**, 436–440 (May 1956)

Experiments are described to illustrate the value of tensile strength and extension tests in identifying damage to wool when treated with acids and alkalis. The results are expressed graphically and include hysteresis curves. B.K.

Quantitative Analysis of Amino Acids by Paper Chromatography
R. H. Hackman and M. Lazarus

Australian J. Biol. Sci., **9**, 281–292 (May 1956)

A simple method for the quantitative analysis of amino acids present in a protein hydrolysate, or in other mixtures of amino acids, is described. The amino acids are separated on one-dimensional paper chromatograms, four solvent systems being used to resolve 17 amino acids. The chromatograms are treated with a suitable reagent to detect the spots corresponding to each amino acid. Each chromatogram, after being made semi-transparent with dimethyl phthalate, is scanned with a densitometer, and the intensity of the light transmitted by the coloured spots is recorded on light-sensitive paper. A straight-line relationship is found to hold, for all amino acids, between concn. and log (% transmission). The most useful range of amino-acid concn. is 2–5 mM., although the method is

usable in the range 1–10 mM. The method includes a number of new techniques, and the average coefficient of variation for a single reading for an amino acid is 5·7%.
P.G.M.

Application of Electron Microscopy to Synthetic Fibres
R. G. Scott and A. W. Ferguson
Text. Research J., **26**, 284–296 (April 1956)
A review of techniques at present in use for the electron microscopy of synthetic fibres. A new method is described in which the region to be studied is rendered insoluble either by chemical treatment or by exposure to a beam of 60-kv. electrons, and the unaffected portions are then removed by solvents. The application of this technique to the study of surface and internal fibre structure is described. 30 electron micrographs. J.C.F.

Determination of the Dyeing Properties of Acid Dyes
H. Egli
Textil-Rund., **11**, 341–347 (June 1956):
Teintex, **21**, 535–544 (July 1956):
Textil-Praxis, **11**, 818–820 (Aug. 1956)
A chromatographic method is described (Egli and Perrig, *ibid.*, **9**, 61 (1954)) whereby dye liquor is circulated through a column of superimposed fabric discs. The distribution of the colour with Xylene Fast Red P (S) and Xylene Fast Bordeaux P (S) (the two extremes of the Xylene Fast P group) shows dyeing properties to be closely similar, other members lying between these limits.
S.R.C.

New Tests for Assessing the Dyeing Properties of Loose Viscose Rayon Staple
J. P. Fleury and J. Meybeck
Bull. Inst. Text. France, (59), 41–55 (April 1956)
Tests are described for checking the regularity of viscose rayon staple as regards its dyeing behaviour. One test involves dyeing with Solophenyl Green Blue BL (Gy) and is designed to detect differences in the coefficient of diffusion of the dye in the fibre. The second test, which employs Diazol Pure Blue 6B (Fran), shows up differences in dyeing affinity at equilibrium. Reproducible results are obtained provided that the tests are carried out under standardised conditions. J.C.F.

Influence of Temperature and Humidity on Fading
P. W. Cunliffe
J.S.D.C., **72**, 330–332 (July 1956)
Results are presented of experiments carried out in 1931 on the influence of temperature and humidity on the degree of fading of eighteen dyes on wool cloth.
AUTHOR

Recommended Conditions for Fading Lamp Operation
Society of Dyers and Colourists, Light Fastness Sub-committee
J.S.D.C., **72**, 369–370 (Aug. 1956)
Many of the discrepancies between daylight exposures and those made in fading lamps arise from differences in the effective humidity during exposure. The average value occurring during daylight exposures in the United Kingdom is 20%, and fading lamps should be adjusted to operate at this effective humidity. AUTHOR

Modification of the AATCC Crockmeter for Yarn Testing
C. R. Trommer
Amer. Dyestuff Rep., **45**, 357–359 (4 June 1956)
A brief review of methods used for measuring rubbing fastness is followed by a description of a simple instrument in which none of the previously encountered faults are present. Yarn is taped to a flat surface and rubbed in the conventional way with a test square, which is rigidly fixed to a horizontal cylinder dowelled to the rubbing finger. One side of the cylinder is machined flat. A test rectangle is thus produced; it is free from wrinkling, and there is no bunching at the edges of the rectangle. J.W.B.

Apparatus for Assessing Fastness to Rubbing
F. Ruf
Textil-Praxis, **11**, 698 (July 1956)
This apparatus was recommended by the German Fastness Committee under DIN 53,959 and may be used for assessing the rubbing fastness of coloured textiles in loose, yarn, cloth, or fabric form. B.K.

Estimation of Copper 8-Quinolinolate in Mildew-proofed Fabrics
A. Rose, A. W. Hutchison, J. R. Hayes, and I. R. Sharkey
Amer. Dyestuff Rep., **45**, 362–364 (4 June 1956);
PB 111,457* (Dec. 1953)
A representative 1-g. sample, weighed to ± 1 mg., is heated to boiling in 20 ml. of 10% H_2SO_4. It is filtered off, and the paper and contents are returned to the flask and again heated to boiling with 10 ml. of 10% H_2SO_4. The procedure is repeated with a further 10 ml., and the paper and contents are washed three times with 5–10 ml. portions of hot water. Extracts and washings are combined, and the pH is adjusted to about 6 (limits 5–7 appear permissible) with dilute (1 : 1) NH_4OH. The solution is transferred to a 500-ml. separating funnel and shaken with several 10–15-ml. portions of pure $CHCl_3$, until the yellow colour has been completely removed. Extracts are combined, stirred with 5–10 g. of anhyd. Na_2SO_4, and allowed to stand for a few minutes to remove water. The solution is transferred to a 100-ml. volumetric flask (50-ml. if the amount of Cu 8-quinolinolate is very small, or 250-ml. if it is very high) and made up to volume with $CHCl_3$, and the % transmission at 410 mμ. is determined. Cells of 1 cm. thickness are recommended. As the reference, the $CHCl_3$ extract from a sample which has been waterproofed, flameproofed, and dyed, but which contains no Cu 8-quinolinolate, may be used. A standard curve, prepared from a known solution of Cu 8-quinolinolate in $CHCl_3$, is used to obtain the weight in the sample by reference.
J.W.B.

* Obtainable from D.S.I.R., T.I.D.U.

New Chromatographic Procedure and its Application to High Polymers
C. A. Baker and R. J. P. Williams
J.C.S., 2352–2362 (July 1956)
A new chromatographic method for the fractionation of mixtures employs equilibration between a moving soln. and a stationary precipitated phase along the length of a column which is virtually a continuous series of filter beds covering a range of temperatures. Its application to the fractionation of polystyrenes is described, and the homogeneity of the fractions is compared with that obtained by earlier methods. H.H.H.

Analytical Aspects of Some Azo Dyes from Chromotropic Acid. I— SNADNS Dyes in Detection and Volumetric Determination of Thorium and Preparation of Such Dyes (IV p. 447)
Progress in the Electron Microscopy of Textile Fibres (VI p. 454)
Heat of Wetting of Viscose Rayon (VI p. 455)
Physical and Chemical Properties of Bimli and Mesta Fibres and their Use in Differentiating these Fibres from Jute (VI p. 455)
Accelerated Light Fading of certain Dyed Fabrics caused by Perspiration (VIII p. 458)
Measurement of Redox Potentials of Vat Dyes and its Practical Application (VIII p. 458)
Measurement of the Extent of Delustring of Filament Fabrics. III— Reflection of Polarised Light (X p. 461)
Cellulose Analysis and Bleaching Methods for Cellulosic Materials. VIII— Degrees of Bleaching of Unbleached Sulphite and Kraft Pulps (XI p. 464)

XV— MISCELLANEOUS

PATENT

Colouring High-silica Glass
Corning Glass Works *BP* 751,711
Modification of *BP* 533,053, the absorption of the colouring agent during impregnation being restricted to a thin layer of the porous glass inwardly removed from its surface. This is achieved by treating the glass with the colouring solution to the desired extent, then immediately continuing impregnation with a volatile liquid, e.g. water, until the solution in the impregnated layer has been moved by capillary action further into the glass, and then drying and firing without fusion so as to close the pores of the glass and seal the colour in it. C.O.C.

TOWN
END

RANGES OF
REPUTATION

DURAMINE and EVRON FAST

[illegible]

AZONINE and DURANTINE FAST

[illegible]

Town End Chemical Works Limited

BRAMLEY [illegible]

FORTHCOMING MEETINGS OF THE SOCIETY—*continued from page xii*

Wednesday, 12th December 1956
NORTHERN IRELAND SECTION. *Printing of Nylon and other Polyamide Fibres.* R. E. Fletcher, Esq., B.Sc., A.T.I. (The Clayton Dyestuffs Co. Ltd.). Thompson's Restaurant, Donegall Place, **Belfast.** 7.30 p.m.

Friday, 14th December 1956
MANCHESTER SECTION. *Pigment Printing— The Possibilities and Limitations.* Dr. Kass (Fabriken Bayer, A.G.). Textile Institute, 10 Blackfriars Street, **Manchester.** 7 p.m.

Wednesday, 9th January 1957
NORTHERN IRELAND SECTION. *Application of Colour Physics to Textiles.* P. H. Oliver, Esq., B.Sc., Grad.Inst.P. and J. C. Guthrie, Esq., M.Sc., F.Inst.P. (Courtaulds Ltd.). Thompson's Restaurant, Donegall Place, **Belfast.** 7.30 p.m.

Thursday, 10th January 1957
MIDLANDS SECTION. *Developments in Analytical Methods in the Dyehouse Laboratory.* R. W. Richardson, Esq., Ph.D., B.Sc., A.R.I.C. and Z. Bergmann, Esq. (Joint with the Society of Chemical Industry). Gas Theatre, **Nottingham.** 7 p.m.

WEST RIDING SECTION. *Full Shades on Secondary Acetate and "Tricel" and Allied Topics.* H. C. Olpin, Esq., M.Sc., F.R.I.C., F.S.D.C., J. Wood, Esq., B.Sc., A.R.I.C. (British Celanese Ltd.). Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Friday, 11th January 1957
LONDON SECTION. Ladies' Evening. *Kippers, Cocktails, Confectionery & Colour.* G. J. Chamberlin, Esq. (The Tintometer Ltd.). Royal Society, Burlington House, **London, W.1.** 6 p.m.

Tuesday, 15th January 1957
SCOTTISH SECTION. *Application of Colour Physics to Textiles.* J. C. Guthrie, Esq., M.Sc., F.Inst.P., F.T.I. and P. H. Oliver, Esq., B.Sc., Grad.Inst.P. (Courtaulds Ltd.). St. Enoch Hotel, **Glasgow.** (Joint Meeting with Textile Institute.) 7.15 p.m.

Friday, 18th January 1957
MANCHESTER SECTION. *A New Approach to the Dyeing of Hydrophobic Fibres.* D. Garrett, Esq. (I.C.I. Ltd.). Textile Institute, 10 Blackfriars Street, **Manchester.** 7 p.m.

WEST RIDING SECTION. Ladies' Evening. Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Tuesday, 22nd January 1957
HUDDERSFIELD SECTION. *Application of Colour Physics to Textiles.* J. C. Guthrie, Esq., M.Sc., F.Inst.P., F.T.I. and P. H. Oliver, Esq., B.Sc., Grad.Inst.P. Silvios Cafe, Westgate, **Huddersfield.** 7.30 p.m.

Wednesday, 23rd January 1957
MIDLANDS SECTION. *Problems in the Processing of Rayon Blends.* R. C. Cheetham, Esq., A.M.C.T., F.R.I.C., and H. D. Edwards, Esq., Ph.D., A.R.I.C. College of Technology, **Leicester.** 7 p.m.

Thursday, 31st January 1957
WEST RIDING SECTION. Discussion, *Detergency.* Panel—R. S. Hartley, Esq., A.R.I.C. (Wool Industries Research Association), G. H. Rostron, Esq., A.R.I.C. (Joseph Crosfield & Sons Ltd.), R. C. Tarring, Esq., B.Sc., A.R.C.S. (Shell Chemicals Ltd.). Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Friday, 1st February 1957
LONDON SECTION. *A Review of the Colour Fastness Requirements in Dyed Textiles.* T. H. Morton, Esq., M.Sc., Ph.D., F.S.D.C. (Courtaulds Ltd.). (Joint meeting with the London Section of the Clothing Institute.) Royal Society, Burlington House, **London W.1.** 6 p.m.

Wednesday, 13th February 1957
NORTHERN IRELAND SECTION. *Fifty Years Dyeing Linen in Ireland.* N. McCraith, Esq., B.Sc. (Joint Meeting with Textile Institute.) Thompson's Restaurant, Donegall Place, **Belfast.** 7.30 p.m.

Thursday, 14th February 1957
WEST RIDING SECTION. *Applications of Colour Physics to Textiles.* J. C. Guthrie, Esq., M.Sc., F.Inst.P., F.T.I. P. H. Oliver, Esq., B.Sc., Grad.Inst.P. (Courtaulds Ltd.). Hotel Metropole, King Street, **Leeds.** 7.30 p.m.

Friday, 15th February 1957
MANCHESTER SECTION. *Problems in the Wet Processing of Rayon Blends.* H. D. Edwards, Esq., Ph.D., A.R.I.C and R. C. Cheetham, Esq., A.M.C.T., F.R.I.C. (Courtaulds Ltd.). Textile Institute, 10 Blackfriars Street, **Manchester.** 7 p.m.

Tuesday, 19th February 1957
HUDDERSFIELD SECTION. *Petroleum Chemicals in the Textile Industry.* H. Bratherton, Esq., A.M.C.T., A.T.I. Silvios Cafe, Westgate, **Huddersfield.** 7.30 p.m.

Wednesday, 20th February 1957
MIDLANDS SECTION. *Basic Mechanisms of Winch Processing.* R. H. Waddington, Esq., B.Sc. Albert Hall Institute, **Nottingham.** 7 p.m.

Thursday, 28th February 1957
WEST RIDING SECTION. *The Applications of Fluid Beds to Dyeing.* J. Wilson, Esq., M.C., M.Sc. and F. G. Audas, Esq. (British Rayon Research Association). Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Friday, 8th March 1957
LONDON SECTION. *Soiling of Natural and Synthetic Fibres.* G. G. Taylor, Esq., B.Sc., A.Inst.P. (Clayton Dyestuffs Co. Ltd.). Royal Society, Burlington House, **London W.1.** 6 p.m.

Wednesday, 13th March 1957
NORTHERN IRELAND SECTION. *Problems in Wet Processing of Rayon Blends.* H. D. Edwards, Esq., Ph.D., A.R.I.C. and R. C. Cheetham, Esq., A.M.C.T., F.R.I.C. (Courtaulds Ltd.). Thompson's Restaurant, Donegall Place, **Belfast.** 7.30 p.m.

Thursday, 14th March 1957
WEST RIDING SECTION. *The Dyeing of Acrylic Fibres.* K. Meldrum, Esq., B.Sc., A.R.I.C. (Courtaulds Ltd.). Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Tuesday, 19th March 1957
HUDDERSFIELD SECTION. Annual General Meeting. Silvios Cafe, Westgate, **Huddersfield.** 7.30 p.m.

Wednesday, 20th March 1957
MIDLANDS SECTION. *Developments in Sizing as they affect the Dyer and Finisher.* J. H. MacGregor, Esq., Ph.D., F.R.I.C., and E. France, Esq., A.R.C.S., A.M.C.T. (Joint with the British Association of Chemists.) Midland Hotel, **Derby.** 7 p.m.

Saturday, 23rd March 1957
NORTHERN IRELAND SECTION. Annual General Meeting and Dinner. Woodbourne House Hotel, **Belfast.** Details later.

Thursday, 28th March 1957
MIDLANDS SECTION. *The Soiling of Natural and Synthetic Fibres.* G. G. Taylor, Esq., B.Sc., A.Inst.P. (Joint with the Textile Institute.) Carpet Trades Canteen, **Kidderminster.** 7.30 p.m.

WEST RIDING SECTION. Annual General Meeting. Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Friday, 29th March 1957
The Society's Annual Dinner. The Grosvenor House, **Park Lane, London.**

Friday, 12th April 1957
MIDLANDS SECTION. Annual Dinner. George Hotel, **Nottingham.** 7 p.m.

Wednesday, 17th April 1957
MIDLANDS SECTION. . . . . *and inwardly digest (a Dissertation on Technical Literature).* S. Burgess, Esq., F.S.D.C., A.M.C.T. (Preceded at 6.30 p.m. by the Annual General Meeting of the Section). King's Head Hotel, **Loughborough.** 7 p.m.

Friday, 3rd May 1957
MIDLANDS SECTION. The Mercer Lecture of the Society. Grand Hotel, **Leicester.** 7 p.m.

MEMBERS' CHANGES OF ADDRESS

Allen, E. A., formerly of Llwyn Celyn, St. Davids Road, Caernarvon, Wales, to 41 Cae Mur, Caernarvon, Wales

Ashruff, A. O. S., formerly of Nottingham and District Technical College, Nottingham, to c/o Dr. M. H. Ashruff, Civil Asst. Surgeon, Muzaffarpur, Bihar, India

Baxter, N., formerly of 14 Chiswick Street, Carlisle, Cumb., to Fabrica de Estamparia e Tinturaria, De Braco de Prata, Braco de Prata, Lisbon, Portugal

Bielawski, F., formerly of "Wilton Grove", Victoria Road, Hawick, Scotland, to 14 St. Austell Road, Whalley Range, Manchester 16

Blakey, G. B., formerly of North Lodge, Staveley Road, Paisley, Scotland, to Cia Ind "El Salvador", Calle Del Rosario, Mexico 1, D.F.

Broadhurst, R., formerly of Flat 1, 814 Wilmslow Road, Manchester 20, to 129 Almsford Drive, Harrogate, Yorks.

Burtonshaw, D., formerly of 4 Brookfield Avenue, Leeds 8, to 659 Gledhow Rise, Leeds 8

Carpenter, A. W., formerly of 45 Westcotes Drive, Leicester, to 61 Russell Avenue, Wollaton, Nottingham

Goddard, A., formerly of 11 Hardmans Road, to 31 Hardmans Road, Whitefield, near Manchester

Horsfield, J. K., formerly of 6 Langley Crescent, Prestwich, Manchester, to 90 Glebelands Road, Prestwich, Manchester

Johnson, F. D., formerly of 3 Grasmere Road, Leeds 12, to 14 Senlac Road, Lee, London, S.E.12

McCracken, W. J., formerly of Admiralty Cottage, Antrim, N. Ireland, to 36 Palm Street, Off Slade Lane, Longsight, Manchester

Nilssen, Bailli, formerly of Postboks 490, Bergen, Norway, to Postboks 11, Blindern, Oslo, Norway

Pieczka-Parker, J. P., A.T.I., formerly of 137 Joan Street, Newcastle-upon-Tyne, to 4 Halewood Avenue, Newcastle-upon-Tyne 3

Potter, J. A., formerly of Harehill Lodge, Over Alderley, Prestbury, Cheshire, to "Windrode", Great Meadows, Prestbury, Cheshire

Sadowski, J. Z., formerly of 24 Claremont Road, Manchester, to 13 Humphrey Burton's Road, Coventry, Warwicks.

Schofield, J., formerly of 27 Charteris Road, Lower Grange, Bradford, to 100 Aldwyn Crescent, Bramhall Moor Lane, Hazel Grove, Cheshire

Villiers, R. F., formerly of 22 Podsmead Road, Gloucester, to 52 Gresham Road, Staines, Middlesex

Younger, K. D., formerly of 37 Dragon Parade, Harrogate, Yorks, to 7 St. Clair Street, Otley, Yorks.

ADDRESSES WANTED

Bromby, N. G., formerly of 170 Palatine Road, West Didsbury, Manchester

Desmond, J. J., formerly of 1416 Molcomb Road, Huntington Valley, Pa., U.S.A.

Gee, B. C., formerly of Ballyregan Road, Dunronald, Belfast, N.I.

Harvey, H. C., formerly of 77 Edinburgh Road, Congleton, Cheshire

Helliwell, G. S., formerly of 12 Stoneygate Road, Leicester

Landreuille, P. P., formerly of 196 Wentworth Street N, Hamilton, Ontario, Canada

Miles, L. W. C., formerly of "Malvern", Park Crescent, Glossop, Derbys.

Musselwhite, A. G., formerly of 6 Margery Terrace, Gummersdale, Carlisle

Roberts, S. K., formerly of 42 Deansgate, Manchester

Shorey, N. W., formerly of 163 Wentworth Street N., Hamilton, Ontario, Canada

Stamires, D., formerly of 9 Shaw Lane, Leeds 6

PERKIN CENTENARY EXHIBITION

LEEDS UNIVERSITY 26–28 SEPTEMBER 1956

The Colour Chemistry and Dyeing Department at the University of Leeds is to hold an Exhibition to commemorate the centenary of the discovery of Mauve by W. H. Perkin, the founder of the synthetic dyestuffs industry. The Exhibition will illustrate the growth of the dyestuffs industry since Perkin's time and recent developments to meet the need for colouring the new man-made fibres. Anyone interested in dyes and dyeing is invited to visit the Exhibition, which will be open from 2 p.m. to 5 p.m. on Wednesday, 9 a.m. to 5 p.m. on Thursday, and 9 a.m. to 4 p.m. on Friday, 26th–28th September.

APPOINTMENTS

Advertisements relating to APPOINTMENTS VACANT, APPOINTMENTS WANTED, and MISCELLANEOUS ITEMS are invited for insertion on this page. Advertisements of Appointments Wanted are gratis to members, but must not exceed twenty-four words.

All inquiries relating to Advertisements should be addressed to THE GENERAL SECRETARY, THE SOCIETY OF DYERS AND COLOURISTS, DEAN HOUSE, 19 PICCADILLY, BRADFORD 1, YORKSHIRE.

Replies may be addressed Box —, THE SOCIETY OF DYERS AND COLOURISTS, DEAN HOUSE, 19 PICCADILLY, BRADFORD 1, YORKSHIRE, where all communications relating to these Advertisements are treated in strict confidence.

PUBLIC APPOINTMENTS

THE UNIVERSITY OF LEEDS
DEPARTMENT OF TEXTILE INDUSTRIES

APPLICATIONS are invited for a Fellowship which has been established by the Bleachers' Association Ltd., for research on cellulosic fibres. The value of the Fellowship, which is tenable for one year in the first instance with possibility of renewal, is £600 per annum together with superannuation contributions under the F.S.S.U. scheme. Candidates should have leaning towards physical or physical-organic chemistry. Applications, stating date of birth, qualifications and experience, together with the names of two referees, should be sent to the Registrar, The University, Leeds 2, from whom further enquiries may be made.

MANCHESTER COLLEGE OF SCIENCE AND TECHNOLOGY
Appointment of
FULL-TIME TEACHER OF TEXTILE FINISHING

THE Governing Body invites application for the appointment of a Full-Time Teacher in the Department of Textile Chemistry.

The chief duties will be to give practical instruction in traditional and modern finishing methods for all classes of textile fabrics. First-hand experience in industrial practice is essential since the successful candidate will be required to operate and maintain efficiently, for teaching and experimental purposes, the new and extensive installation of full-width finishing machinery in the College dyehouse.

Salary Scale— £525 per annum rising by annual increments of £25 and one final increment of £20 to a maximum of £820. Subject to this maximum not being exceeded, one increment of £18 will be added to the minimum in respect of each year of approved industrial experience up to a maximum of twelve, together with one further increment (usually £18) for each year of previous full-time teaching service. There are also certain additional training and graduate allowances. The salary scale is at present under review.

Form of application may be obtained from The Registrar, College of Science and Technology, Manchester 1. Last date for the receipt of applications is 30th September 1956.

APPOINTMENTS VACANT

CANADA— Assistant Superintendent (Assistant Manager) required for the Dyeing and Finishing departments of Canadian Celanese Limited, Drummondville, Quebec. Must have sound knowledge and experience in the dyeing and resin finishing of Acetate/Viscose fabrics and blends. The position offers an excellent opportunity for a man with initiative and ideas to work with modern equipment under first-class conditions. Attractive salary in accordance with qualifications and experience. Group Insurance and Superannuation Plan in operation. Interviews will be arranged in England, and passage for the successful applicant will be fully paid. Reply giving full details to Dyehouse Superintendent.

CANADA— Dyehouse Chemist for laboratory of Canadian Celanese Limited, Drummondville, Quebec. Age 25 to 35, preferably married. Must have a sound knowledge of textile chemistry, and be able to organise and control laboratory staff. This position offers a sound opportunity for advancement with an expanding organisation, and carries with it Group Insurance and Superannuation benefits. Interviews will be arranged in England, and passage for the successful applicant will be fully paid. Reply giving full details to Dyehouse Superintendent.

DYEHOUSE CHEMIST/TECHNOLOGIST is required for development and technical service with a large company in the Midlands. Applicants should have a degree or equivalent qualification in colour chemistry or textile technology. Additional experience in dyeing and finishing would be advantageous. Age preferably over 25. The appointment is pensionable. Candidates should write giving details of experience and full personal particulars to Box V112.

REQUIRED for South Africa, progressive young man to take charge of the dyeing of wool and wool blend carpet yarns. Knowledge of carpet piece-dyeing would be an advantage. Applicant should be capable of organising and carrying out experimental work. Salary upwards of £1,500 p.a., depending on qualifications. Box V111

TECHNICAL REPRESENTATIVE. Tootal Broadhurst Lee Co. Ltd. has a vacancy for a technical/commercial representative. The job combines process investigation and development work with technical servicing of the Company's licensees in the textile finishing industry. The appointment is based on the United Kingdom with opportunities for travel abroad and it provides an excellent entry to an expanding aspect of the commercial field. A qualification in textile technology, chemistry, physics or commercial engineering is desirable but previous business experience, though useful, is not essential. Please apply, giving details of age, education, qualifications and experience, to the Personnel Manager, 56 Oxford Street, Manchester 1.

TEXTILE CHEMISTRY. Applications are invited for several new appointments in a major industry which is expanding its activities in the development of textile dyeing and finishing techniques. In each case a university degree in Chemistry or Textile Chemistry is essential and one of these positions is of senior status demanding a very thorough background of experience in technological research on textile fibres, dyestuffs and finishes. The starting salaries will vary between £800 — £1400, according to experience and there will be excellent opportunities for progress. Applications will be treated in strict confidence and in certain circumstances accommodation may be available for married men. Box V109

WOOL TOP DYER FOR AUSTRALIA. A suitable man is desired with experience in Dyes and Top Dyeing, for High-grade Worsteds and Outerwear, capable of controlling Dyehouse in large Textile Mill. Knowledge of Dyeing Synthetics an advantage. Excellent conditions, Amenities, and Superannuation. Please state experience, age, marital status and salary required. Write Box W640, c/o Streets, 110 Old Broad Street, London, E.C.2.

YOUNG DYER required for dyehouse in Stockport district. Mostly winch dyeing— all types of fibres. Promotion to a position of responsibility is contemplated, and training to this end will be provided. Applicants should have studied chemistry to G.C.E. or higher standard. Box V113

APPOINTMENTS WANTED

F.S.D.C., F.T.I., M.Sc. Tech. (Manchester), Indian, aged 57, desires executive position in India with any firm. 33 years' mill, teaching and administrative experience. Held the position of Director of Industries. High level contacts with Industry and Government. Had practical training in well-known dyestuff manufacturing concerns in U.K. Box W566

TEXTILE TECHNOLOGIST, Polish, 31, College graduate, Higher Diploma Dyeing Finishing, requires position U.S.A. Extensive laboratory production development experience in synthetic fabrics with modern dyers finishers. Box W568

YOUNG MAN, four years dyeing experience, H.N.C. passed, desires position. Anything dyeing considered. Box W567

JOURNALS WANTED

The Society is urgently wanting Journals for all months of 1955 except July and December. The months of August and September 1955 are particularly required. Copies of January, February, March, and April 1956 issues are also in demand. Please address communications to the General Secretary.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